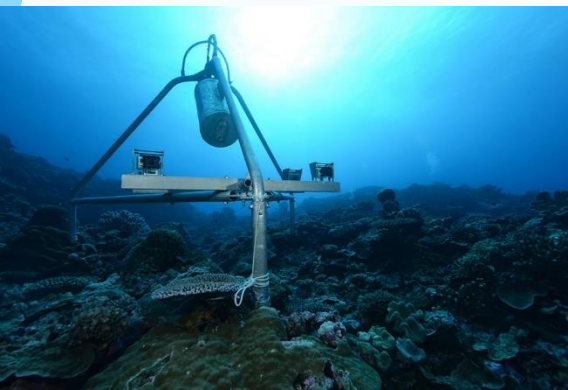




Dialogue on Marine Solutions

Eco-acoustic monitoring applied to marine biodiversity conservation

10/12/20





VITAL SITES

THE JOURNEY TO MARSEILLE

presented by



The Journey to Marseille", a 6-month series of online events and multimedia content to run between June 2020 and the rescheduled World Conservation Congress in 2021

The journey **highlights activities, stories, expert opinions, and case studies** on the **importance of protected and conserved areas from around the world**, with a series of multimedia events and activities on our new digital platform.

2nd BEST event: Dialogue on Marine Solutions in Indian Ocean and Macaronesia



Agenda

- Introduction (10'): BEST & PANORAMA
- Session 1 (15'): Experience of the CORCOPA project
- Session 2 (15'): Experience of the B-CHARMED project
- Q&A (10')
- Session 3 (10'): Insights from an Indian Ocean Expert
- Q&A (5')

Conviviality Principles

www.bigstock.com - 224807233





Speakers



Carole Martinez

IUCN Senior Grant
Manager and BEST
Coordinator



Aissa Traore

IUCN PANORAMA
Programme
Officer



Simon Elise

PhD University
of La Réunion



Francisco Otero Ferrer

PhD, University of
Las Palmas de
Gran Canaria





Aissa Traore

Aissa TRAORE worked on the field for the UN High Commissioner for Refugees where she was part of the Protection Cluster coordination. She served as a programme management consultant for the Francophonie and the African Union election observation missions. She has also worked for the European Parliament in Brussels and the Permanent Mission of Mali to the United Nations in Geneva. She is working now as Programme Officer, part of the PANORAMA partnership initiative coordination, under the Global Protected Areas Programme, based at the IUCN headquarters in Gland, Switzerland.



PANORAMA

SOLUTIONS FOR A HEALTHY PLANET

www.panorama.solutions



Introduction to PANORAMA : Solutions for a healthy Planet

Aissa TRAORE

PANORAMA partnership Secretariat

IUCN

Why focus on what works?



Learning from proven success
– avoid re-inventing the wheel

About PANORAMA – Solutions for a Healthy Planet

Global multi-actor partnership
Support learning from “what works”



+ 750 solution
case studies

1600+ replicable
success factors
(“Building blocks”)

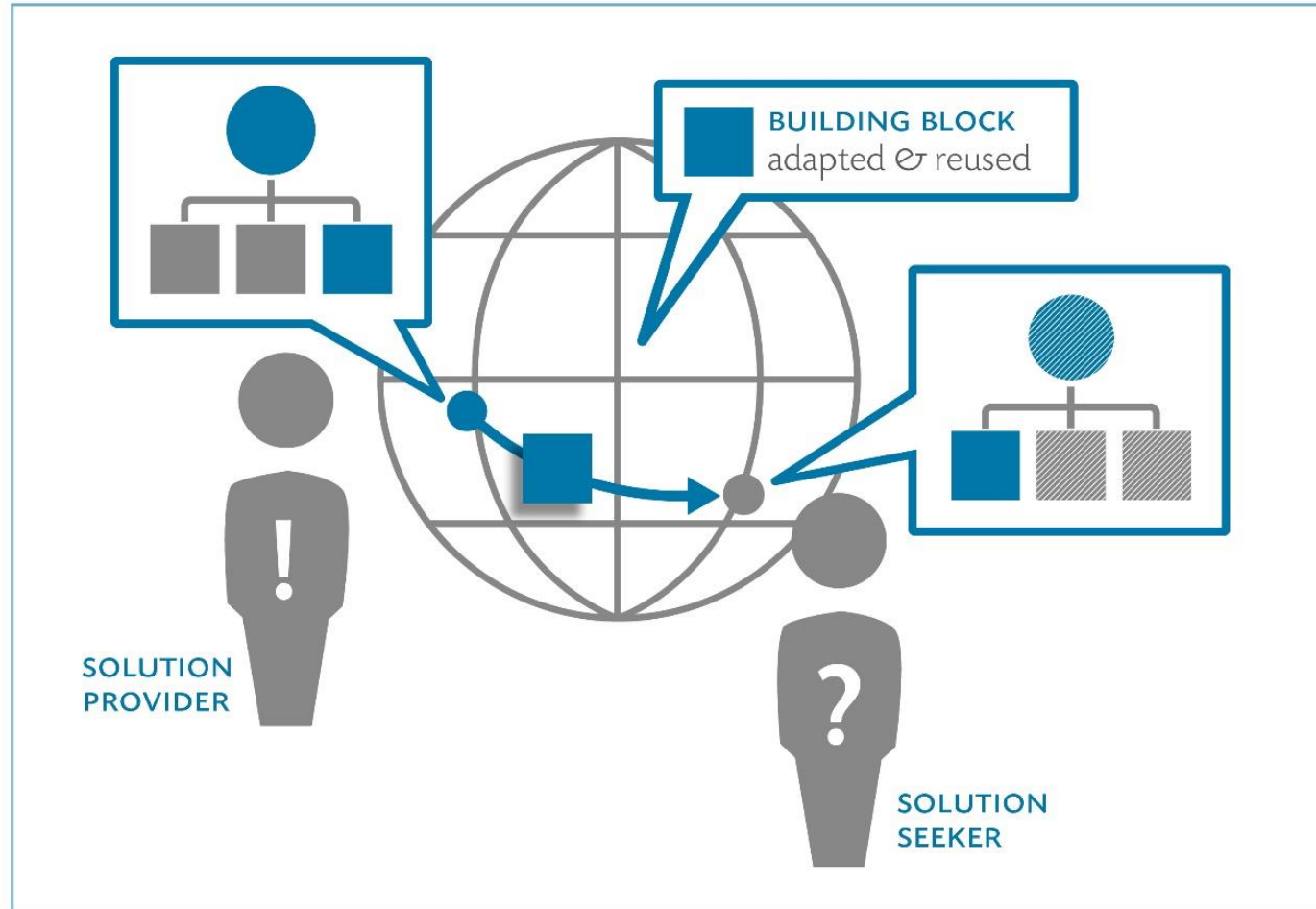
550+ Solution
Providers

PANORAMA Solutions ...

are tools, methods, processes and approaches that **work and inspire action**, and

- have an impact
- are scalable
- address conservation and development challenges in an integrated manner

Local action – Global learning



Integrated Learning and Knowledge Sharing

Communications

- Publications
- Newsletters
- Webinars
- Social Media
- Videos



Contests

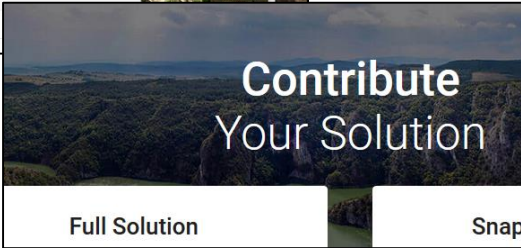
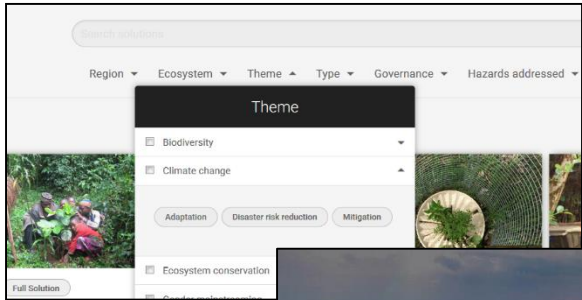
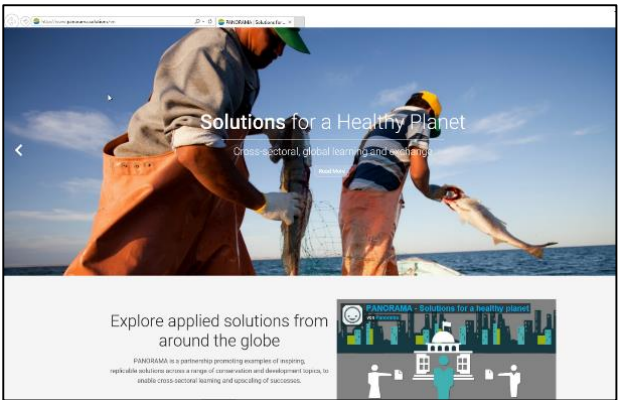


Face-to-face meetings

- Workshops
- Trainings
- Side Events at Conferences



Sophisticated online platform
www.panorama.solutions



Learning from what works

An inspiring
Partnership Initiative



Backed by a
Powerful Alliance



Contributes to
Global Policy Goals



Includes a
Leading Online Database



The PANORAMA partnership

A joint initiative...



Secretariat



Development Partners:



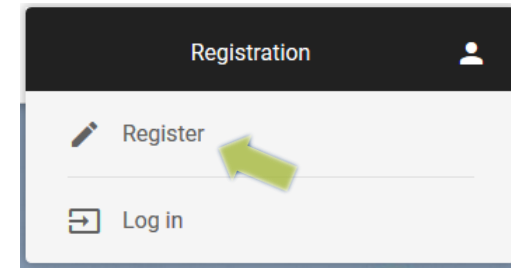
...with thematic communities

- Protected areas
- Marine and coastal
- Ecosystem-based Adaptation
- Agriculture and Biodiversity
- Business engagement
- Nature-Culture
- Sustainable urban development



Creating PANORAMA account

- www.panorama.solutions
- Click “Register” on top right.
- Enter name and email, agree to ToS.
- Confirm email address via link in the confirmation email (check your spam folder).
- Complete profile





SOLUTIONS FOR A HEALTHY PLANET

www.panorama.solutions

Questions ?



SOLUTIONS FOR A HEALTHY PLANET

www.panorama.solutions

Thank you!

www.panorama.solutions

#PanoramaSolutions

contact@panorama.solutions



Carole Martinez

Carole Martinez, has been working on islands, marine and EU Overseas environmental issues or more than twenty years.

Before joining IUCN, Carole worked as head of the Regional marine cooperation programme for the French Government coordinating Overseas activities of the French MPA Agency in the Pacific, the South America and Caribbean region, the Indian Ocean region and the Polar and Sub-Polar region.

Lawyer by training she is currently Senior Grant manager in charge of two re-granting mechanisms in the EU Overseas and ACP countries based at the IUCN Head quarter.



A European initiative to foster action in 7 regions of global importance

BEST

VOLUNTARY SCHEME FOR BIODIVERSITY AND ECOSYSTEM SERVICES IN TERRITORIES OF EUROPEAN OVERSEAS



BEST (Biodiversity and Ecosystem Services in Territories of European Overseas) aims to strengthen biodiversity and ecosystem conservation, sustainable development, and management of ecosystems and ecosystem services, as well as climate change adaptation and mitigation in the 7 European Overseas regions by:

1. Profiling key biodiversity areas (KBAs) & priority areas for action
2. Defining investment niches & supporting actions on the ground through project funding
3. Raising awareness & building capacity

Regional profiling - a scientific & participatory process

- Proven assessment tool to efficiently guide conservation efforts and investments
- A division of work smartly combining central coordination and regional teams
- A participatory process through consultations and workshops with regional and local stakeholders and experts
- Regional assessments based on most recent scientific data, experts and stakeholders' inputs & observations
- A tailored approach to define investment niches & priorities matching EU Overseas stakeholders' needs for future project funding

Caribbean region

- Coral reef restoration
- Marine protected area
- Sea turtle conservation
- Coastal wetlands preservation
- Agroecosystems - ecosystem service quantification
- Invasive alien species control
- Payment for ecosystem services

Polar/Sub-Polar

- Seabird conservation
- Community biodiversity monitoring

Global

- Global partnerships
- Multilateral agreements

Macaronesia

- Seagrass ecosystem services

Indian Ocean

- Island dynamics and conservation
- Terrestrial reptile conservation
- Environmental education
- Whale conservation
- Forest protection
- Loggerhead turtle conservation & Fisheries by-catch mitigation

Pacific

- Regional marine conservation
- Dry forest restoration
- MPA management capacity building
- Endangered species conservation (2 projects)
- Environmental management strategies
- Coral reef ecosystem services
- Spatial planning

Amazonia

- Species monitoring

South Atlantic

- Forest restoration & biosecurity
- Educational nature trails
- Gumwood restoration
- Marine spatial planning
- Climate change risk assessment

Polar/Sub-Polar

- Marine conservation
- Participative climate change impact monitoring



Legend

- EU Overseas Countries and Territories (OCTs)
- EU Outermost Regions (ORs)
- African, Caribbean and Pacific (ACP) group of states and island states of the same regions
- Exclusive Economic Zone (EEZ) of the EU
- BEST projects funded in 7 EU Overseas regions & project focus

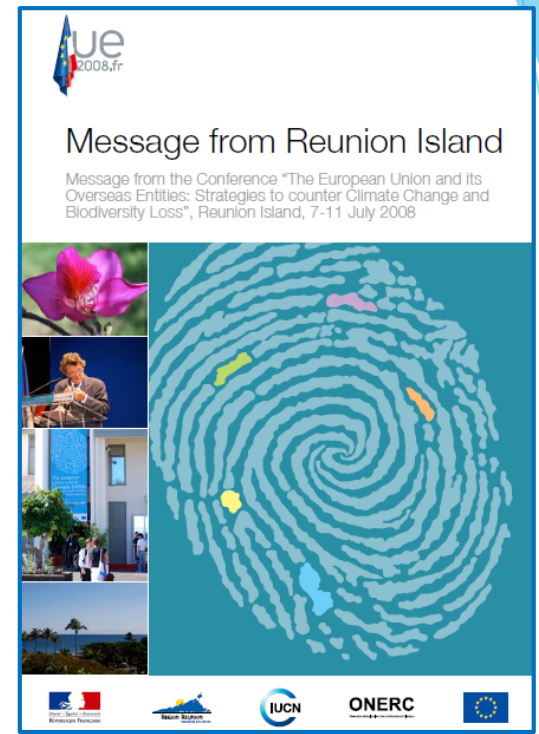
For more information
<http://ec.europa.eu/best/>
<https://portals.iucn.org/best/>





1st EU Conference on EU Overseas Biodiversity Message from La Réunion


European Parliament
Preparatory Action



ue
2008.fr

Message from Reunion Island

Message from the Conference "The European Union and its Overseas Entities: Strategies to counter Climate Change and Biodiversity Loss", Reunion Island, 7-11 July 2008



13. There is an urgent need for EU Member States and the European Commission, together with the ORs and OCTs, to establish a voluntary scheme for the protection of species and habitats, inspired by the Natura 2000 approach. This scheme should be easily accessible, flexible, adapted to the local situation, balance conservation and development needs, as well as take into account existing mechanisms and tools. The implementation of the scheme should be based on local commitment and shared financing.



A European initiative to foster action in 7 regions of global importance



BEST (Biodiversity and Ecosystem Services in Territories of European Overseas) aims to strengthen biodiversity and ecosystem conservation, sustainable development and management of ecosystems and ecosystem services, as well as climate change adaptation and mitigation in the 7 European Overseas regions by:

1. Profiling key biodiversity areas (KBAs) & priority areas for action
2. Defining investment niches & supporting actions on the ground through project funding
3. Raising awareness & building capacity

Regional profiling - a scientific & participatory process

- Proven assessment tool to efficiently guide conservation efforts and investments
- A division of work smartly combining central coordination and regional teams
- A participatory process through consultations and workshops with regional and local stakeholders and experts
- Regional assessments based on most recent scientific data, experts and stakeholders' inputs & observations
- A tailored approach to define investment niches & priorities matching EU Overseas stakeholders' needs for future project funding

Caribbean region

- Coral reef restoration
- Marine protected area
- Sea turtle conservation
- Coastal wetlands preservation
- Agroecosystems - ecosystem service quantification
- Invasive alien species control
- Payment for ecosystem services

Polar/Sub-Polar

- Seabird conservation
- Community biodiversity monitoring

Global

- Global partnerships
- Multilateral agreements

Indian Ocean

- Island dynamics and conservation
- Terrestrial reptile conservation
- Environmental education
- Whale conservation
- Forest protection
- Loggerhead turtle conservation & Fisheries by-catch mitigation

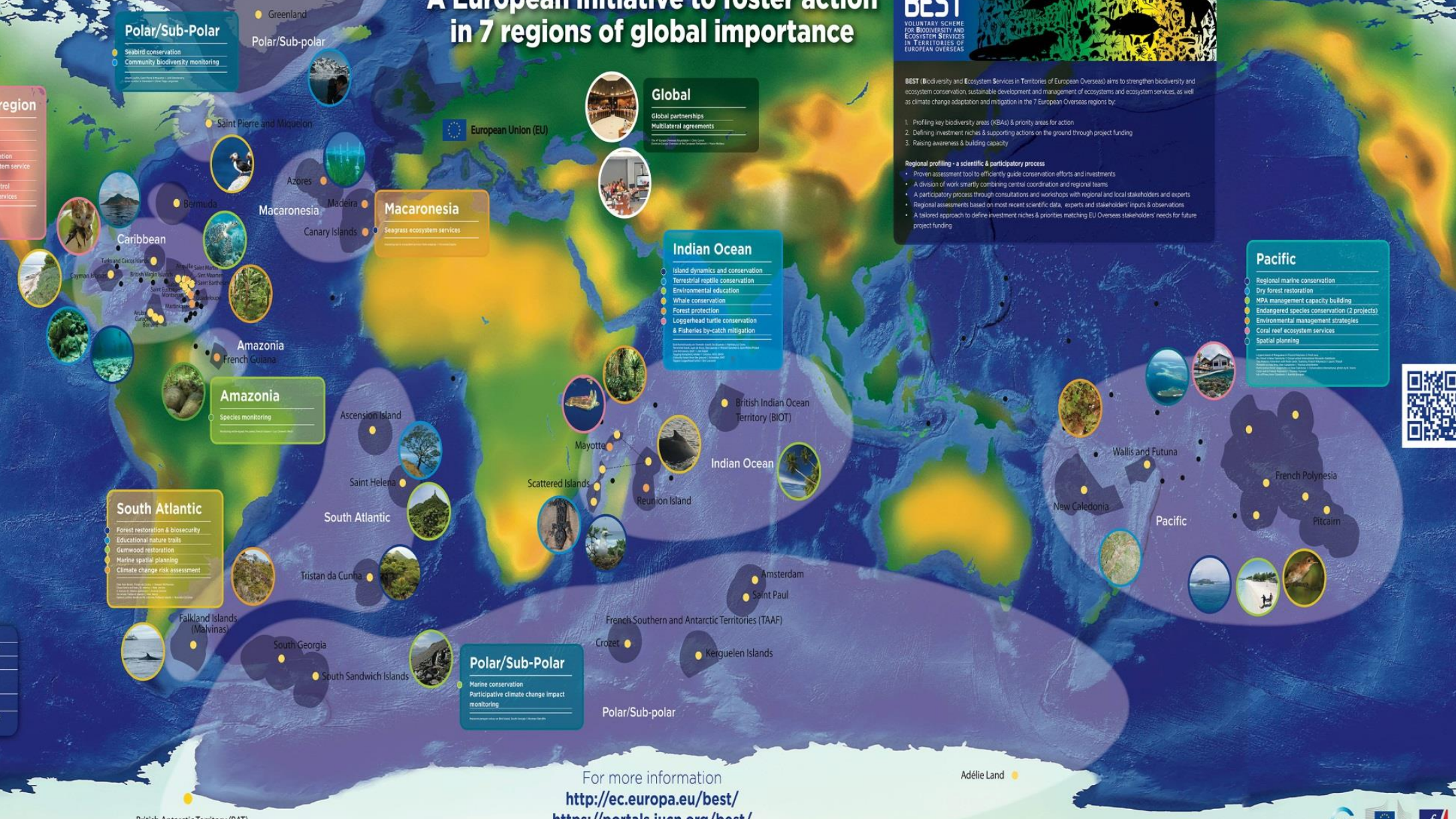
Pacific

- Regional marine conservation
- Dry forest restoration
- MPA management capacity building
- Endangered species conservation (2 projects)
- Environmental management strategies
- Coral reef ecosystem services
- Spatial planning



Legend

- EU Overseas Countries and Territories (OCTs)
- EU Outermost Regions (ORs)
- African, Caribbean and Pacific (ACP) group of states and island states of the same regions
- Exclusive Economic Zone (EEZ) of the EU
- BEST projects funded in 7 EU Overseas regions & project focus



For more information
<http://ec.europa.eu/best/>
<https://portals.iucn.org/best/>



A flexible scheme

A wide scope

Promoting conservation and sustainable use of biodiversity and ecosystem services in European Outermost Regions and European Overseas Countries and Territories.



A tailored scheme

*Letting local stakeholders to define their projects according to their needs

*Offering a diversity of grants to address the diversity of needs & capacities:

Swift Grants ≤ € 50,000

Small Grants ≤ € 100,000

Medium Grants ≤ € 400,000

*More accessible : No co-funding for swift and small grants only 5% for Medium Grants



Objectives

- 1. **To facilitate access to EU funds** for actors in the **EU Outermost Regions (ORs)** and **EU Overseas Countries and Territories (OCTs)** so as **to unlock initiatives** and potential in the fields of biodiversity conservation and the sustainable use of ecosystem services, including ecosystem-based approaches to climate change adaptation and mitigation, as a basis for sustainable development.
- 2. **To increase the capacity** of ORs and OCTs actors to access and effectively manage EU funds.
- 3. **To increase the visibility** of EU ORs and OCTs as key contributors to the achievement of EU and global biodiversity targets and strategies.



A European Initiative of international importance

Decision of the CBD COP XI/15 on the Review of the Programme of Work on Island Biodiversity mentions the BEST initiative among the “the progress on sustainable financing mechanisms developed in island regions for climate change and Biodiversity”.

BEST Challenge

BEST initiative as the first interregional GLISPA challenge



"BEST has helped to raise awareness for the ecological importance of the Outermost Regions and Overseas Countries and Territories for conserving global biodiversity and we are working together with the partners to transform BEST into a sustainable partnership." - Humberto Delgado Rosa, Director Natural Capital, European Commission Directorate General for Environment

"BEST not only offers an opportunity to cope with problems, but also to engage with sovereign states, islands and I want to see this strengthened" - Bráulio Ferreira de Souza Dias, Executive Director, Secretariat for the Convention on Biological Diversity



The BEST Challenge is a commitment to promote conservation and sustainable use of biodiversity and ecosystem services, including ecosystem-based approaches to climate adaptation and mitigation in the EU overseas. This will be achieved through strengthening collaborations between sovereign island nations, countries with islands and EU overseas entities by sharing island-led solutions to global challenges. The Challenge also aims to inspire others in the international community to join the movement to build resilient and sustainable island communities around the world.

Launched by the European Commission with the Deputy Premier of the British Virgin Islands during a high level event at the 13th Conference of the Parties of the Convention on Biological Diversity (CBD COP-13) in December 2016, the BEST Challenge is the first interregional challenge to be promoted through GLISPA.



Results



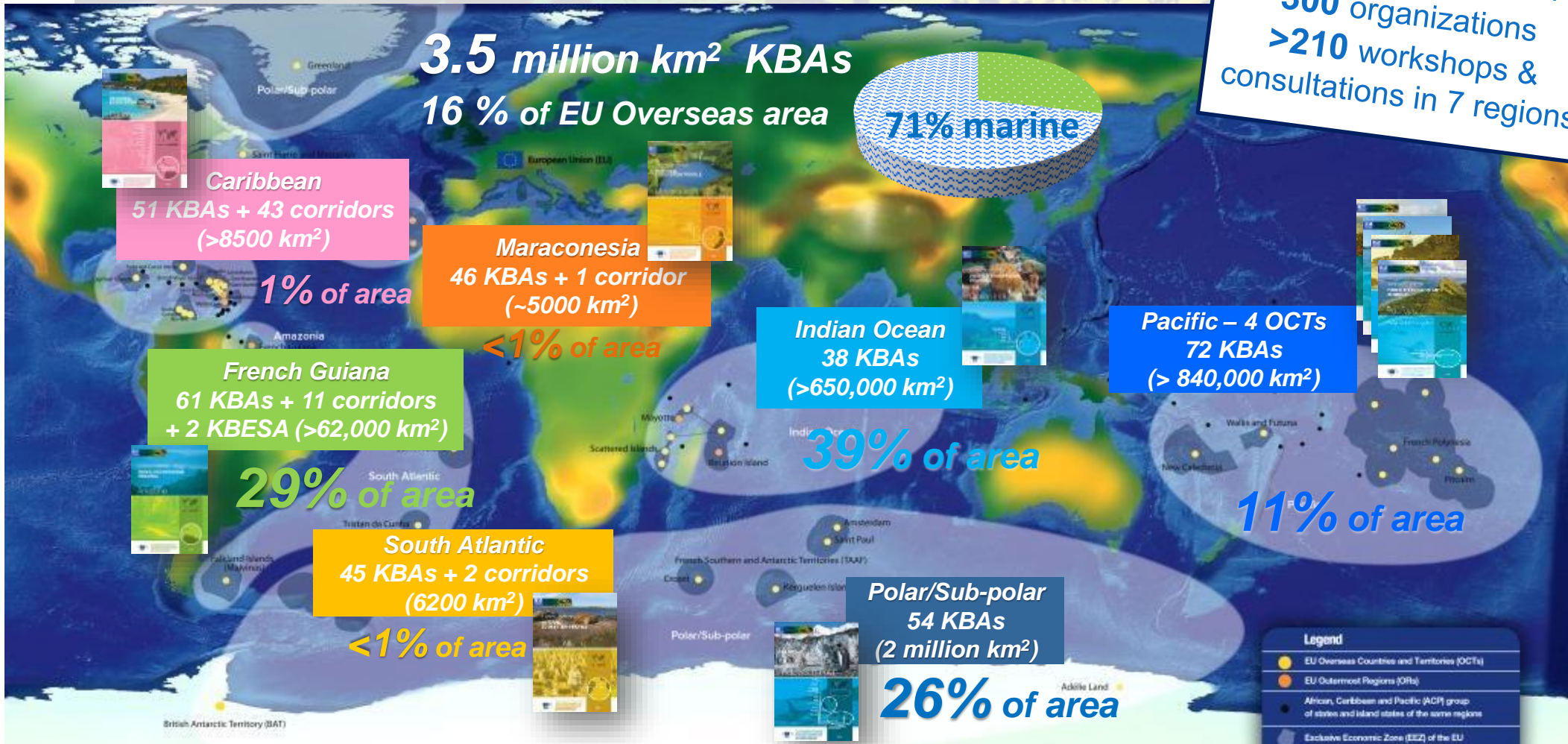
- ✓ **7 regional ecosystem profiles**
- **400 new key biodiversity areas (KBAs)**
- &
- ecological corridors identified (3.5 million km²)**

367 new Key Biodiversity Areas (KBAs)

57 Ecological Corridors

+ 2 Key Biodiversity and Ecosystem Services Area

Participatory process mobilized
900 stakeholders from >
300 organizations
>210 workshops & consultations in 7 regions



Results



✓ 7 regional ecosystem profiles

➤ 400 key biodiversity areas (KBAs) & ecological corridors identified (3.5 million km²)

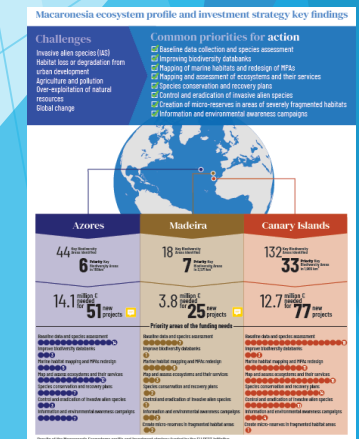
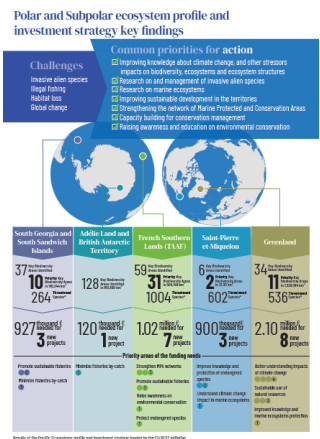
✓ 7 regional investment strategies

4 x more funding needed than invested in the past by BEST

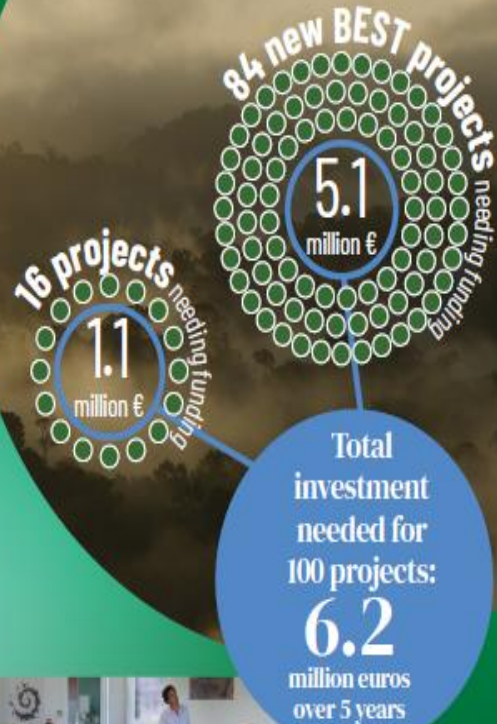
○ 450 projects ready-to-be funded projects identified as

investment niches

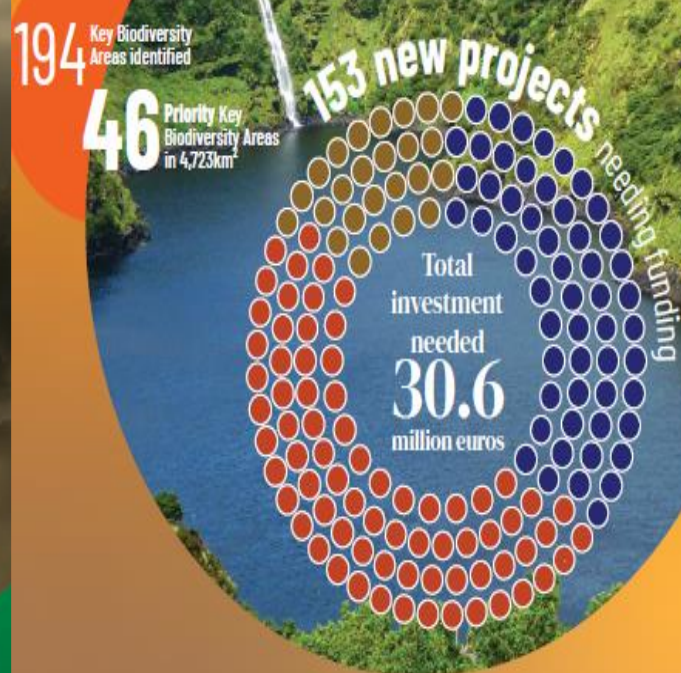
○ > € 90 million funding needs next 5 years



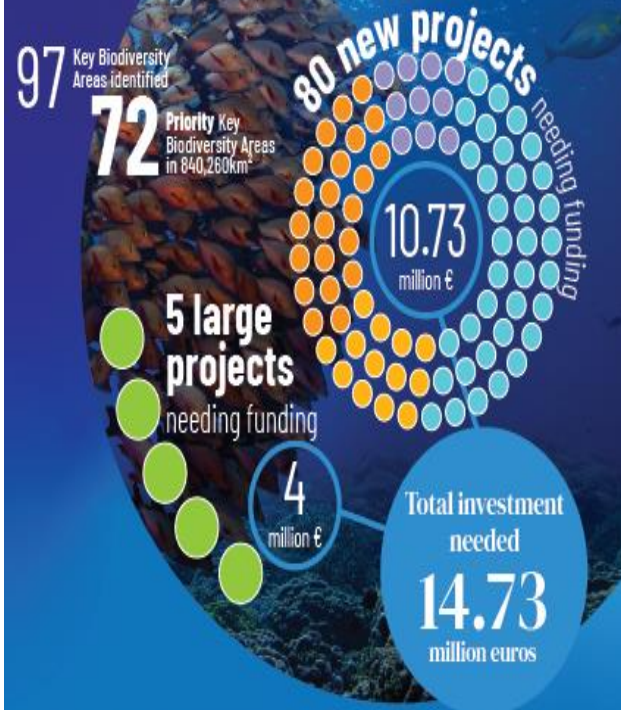
Amazon Ecosystem Profile and Investment strategy key figures



Macaronesia Ecosystem Profile and Investment strategy key figures



Pacific Ecosystem Profile and Investment strategy key figures



Polar and Subpolar ecosystem Profile and investment strategy key figures



2014-2017 Consultation efforts for the Ecosystem Profile and the Regional Investment Strategy

Led by the WWF France, the consultation for the Ecosystem Profile and the Regional Investment Strategy mobilized **more than 50 stakeholders from 20 organizations** (government institutions, civil society and research organizations). **Over 20 formal consultations and workshops** were organized and, between 2016 and 2017, **7 regional meetings** were held.

2014-2017 Consultation efforts for the Ecosystem Profile and the Regional Investment Strategy

Over **123 regional stakeholders** were mobilized for the BEST III Ecosystem Profile and Regional Investment Strategy, from government organizations, the scientific community, NGOs and the private sector. **21 workshops** were organized across the three archipelagos between 2014 and 2016, in addition to specific interviews and expert consultancies.



NATURA 2000

Coordinated network of EU protected areas. Macaronesia, the only EU Overseas region included in the network, has 290 sites over 32,500 km² on land and sea. The BEST Ecosystem Profile for Macaronesia highlighted important gaps in conservation:

- Territorial mismatches between Natura 2000 sites and identified KBAs
- Many endangered species are not covered by European directives



2014-2017 Consultation efforts for the Ecosystem Profile and the Regional Investment Strategy

As illustrating the efforts: **Over 280 stakeholders from 70 organizations** (government institutions, civil society and research organizations)

Over 30 formal consultations and workshops
7 regional meetings

Funding needs are **3,5 times more** than the previous funding for BEST 2011-2017 calls:



2015-2017 Consultation process for the Ecosystem Profile and the Regional Investment Strategy

The consultation for the Ecosystem Profile and the Regional Investment strategy within the framework of BEST III mobilized **more than 150 stakeholders from civil society, government institutions and research organizations** of Polar and Subpolar O.C.T.s. Five workshops were organized: one in Nuuk, Greenland, and four in Paris, France, in addition to numerous bilateral exchanges and consultations.





Results

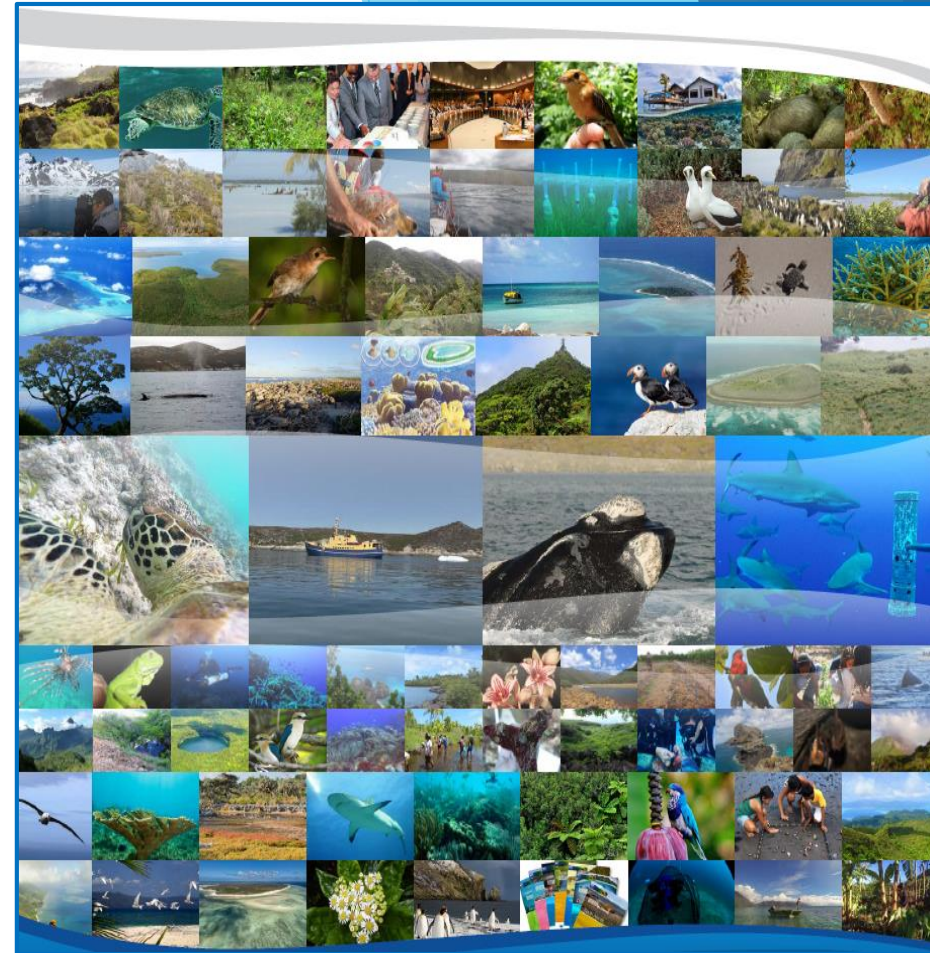


- ✓ 7 regional ecosystem profiles
 - > 400 key biodiversity areas (KBAs) & ecological corridors identified (3.5 million km²)
- ✓ 7 regional investment strategies
 - > 450 projects ready-to-be funded projects identified as investment niches
 - > € 90 million funding needs next 5 years
- ✓ **1 Overview of existing biodiversity lists species, habitats + recommendations**



Results

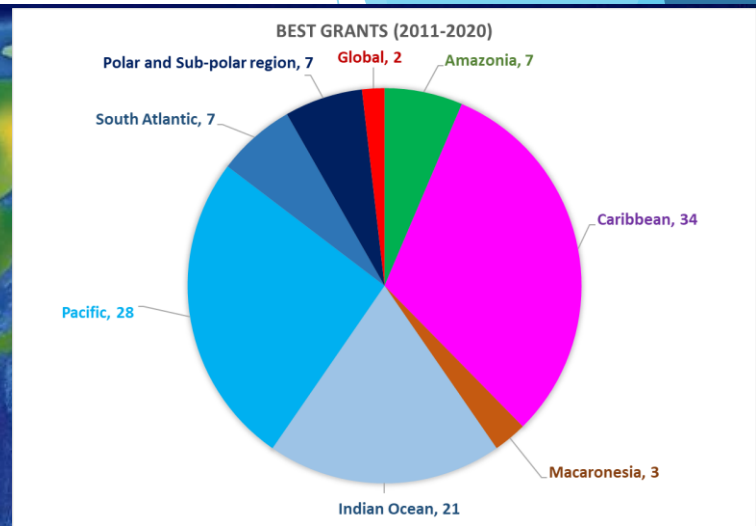
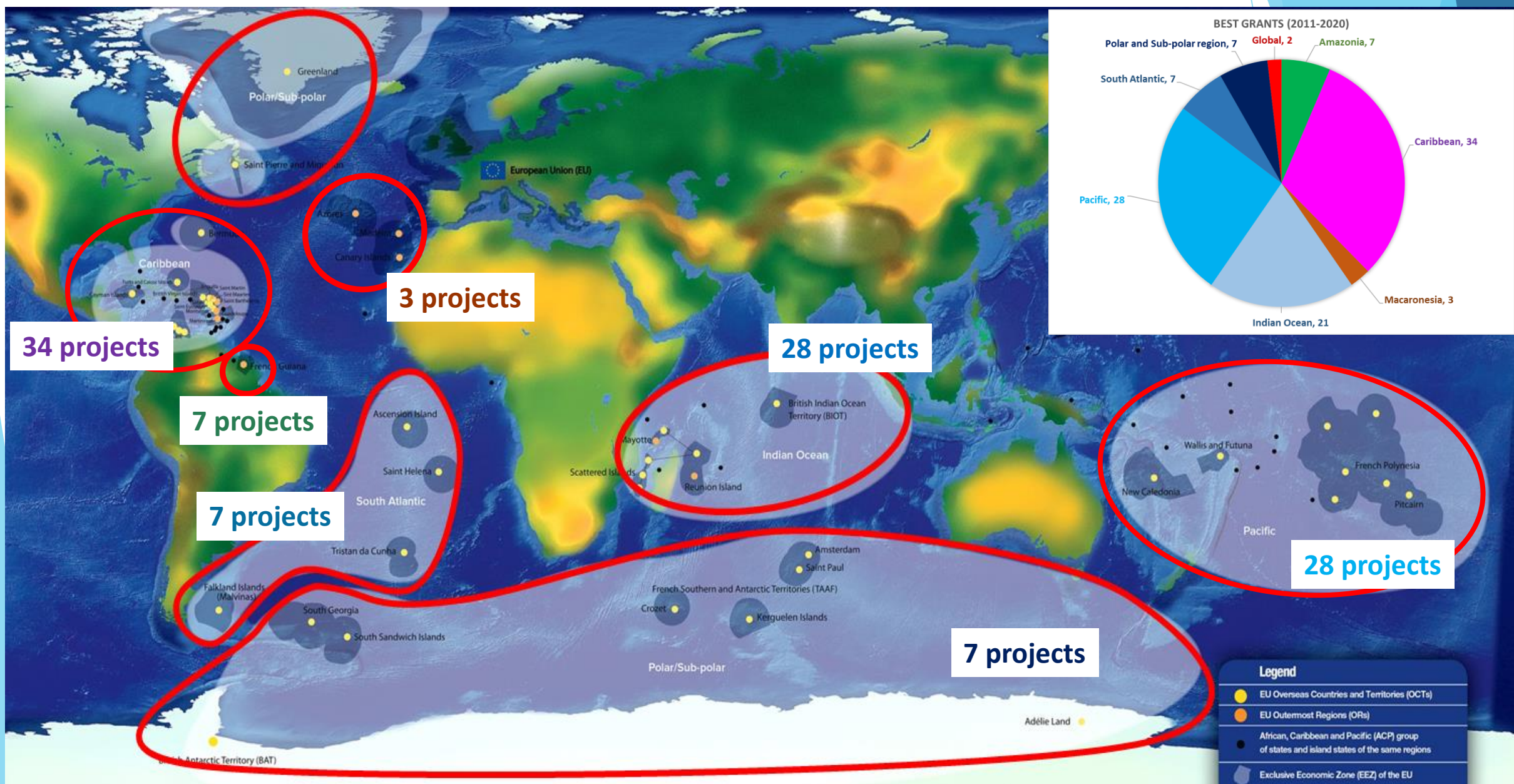
- ✓ **109 projects funded – 20 M :**
- **+ new to come in 2021 :**
- > 60 preselected proposals!**



on-going-call for proposals



on-going call for proposals



Legend

- EU Overseas Countries and Territories (OCTs)
- EU Outermost Regions (ORs)
- African, Caribbean and Pacific (ACP) group of states and island states of the same regions
- Exclusive Economic Zone (EEZ) of the EU



Awakening vocations :
more than **120 jobs** created



Involving communities and citizens :
more than **650 volunteers** mobilised



Capacity building :
More than **100 workshops** organised



Raising awareness :
More than **500 awareness-raising events**
reaching circa **50,000 people**



Enhanced conservation measures :

More than **475,000 km²** of marine and coastal areas
More than **1400 species** benefited from new inventories
12 new species discovered
3 new protected areas created

Sustainability & leverage effect :

more than **40 projects** continued
beyond BEST grants
More than **400 collaborations** initiated



BEST
VOLUNTARY SCHEME FOR BIODIVERSITY AND ECOSYSTEM SERVICES IN TERRITORIES OF EUROPEAN OVERSEAS

BEST IMPACT FACTSHEET

INDIAN OCEAN • 2015-2019



PROJECT RESULTS

CONSERVATION OF BIODIVERSITY, SUSTAINABLE USE OF ECOSYSTEM SERVICES

ECOSYSTEM

SPECIES

All the projects were dedicated to the conservation of biodiversity and ecosystem services, with a focus on terrestrial areas (60%). Project amounts ranged from €6,000 to €400,000.

- 395 km² covered by Invasive Alien Species prevention and control measures.
- 3,492 km² benefited from new assessments or analysis, as below:

Marine and Coastal Areas
2,225 km²

Terrestrial and Freshwater Areas
1,267 km²

- An updated assessment (inventory) was carried out for 236 species.
- 11 new species discovered for the first time: Colubrina, Cynorkis, Diospyros, Erythroxylum, Gagnebina, Gymnosiphon, Kedrostis, Valkameria, Brissalius, Echinolampas, Metalia sp.
- 28 endangered species benefited from protection measures.

PROJECT RESULTS

CONSERVATION OF BIODIVERSITY, SUSTAINABLE USE OF ECOSYSTEM SERVICES

ECOSYSTEM

SPECIES

All the projects were dedicated to the conservation of biodiversity and ecosystem services, with a focus on terrestrial areas (60%). Project amounts ranged from €6,000 to €400,000.

- 395 km² covered by Invasive Alien Species prevention and control measures.
- 3,492 km² benefited from new assessments or analysis, as below:

Marine and Coastal Areas
2,225 km²

Terrestrial and Freshwater Areas
1,267 km²

- An updated assessment (inventory) was carried out for 236 species.
- 11 new species discovered for the first time: Colubrina, Cynorkis, Diospyros, Erythroxylum, Gagnebina, Gymnosiphon, Kedrostis, Valkameria, Brissalius, Echinolampas, Metalia sp.
- 28 endangered species benefited from protection measures.

PROJECT RESULTS

CAPACITY BUILDING, SUSTAINABILITY, AND VISIBILITY

PEOPLE

SCIENCE AND MEDIA

INSTITUTIONS AND POLICY

- 11 jobs were supported, and over 100 volunteers were involved in BEST projects.
- 128 individuals were trained by BEST beneficiaries.
- 24 education and awareness-building events were organised, reaching more than 47,000 people.
- Projects resulted in over 20 publications.
- 50 collaborations were initiated or strengthened at the local, regional, and international level.
- 80% of projects extended their activities beyond the lifespan of the BEST grants.

<https://www.best2plus.org/>

<https://www.life4best.org/en/home>



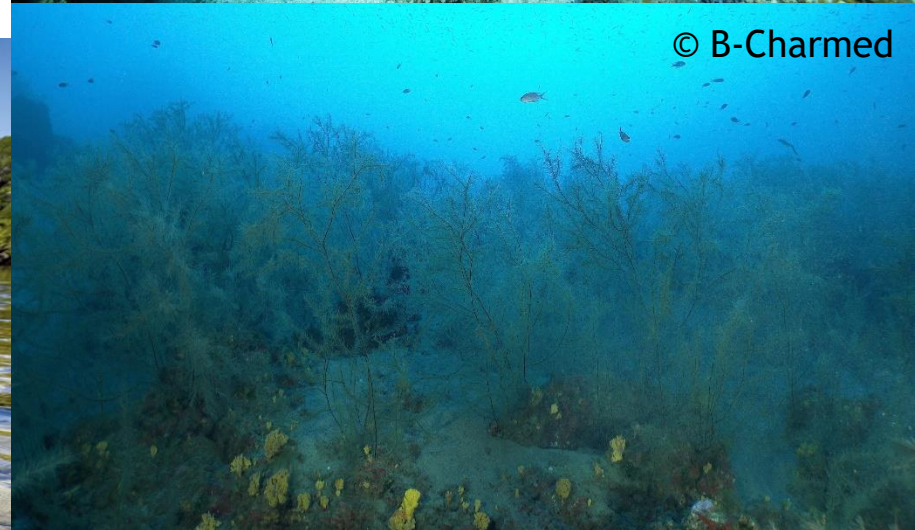
*Thank you for
your kind attention*



© Simon Elise



© Bruno Marie



© B-Charmed



© Simon-Elise



Simon Elise

Engineer, Simon have been working at the interface between conservation and research for the last 10 years.

Passionate about coral reefs, he aims to contribute to the improvement of their monitoring, in order to support their management.

Last year, he completed his PhD at the University of Reunion Island, dedicated to the development of ecoacoustic indices for coral reef monitoring.





Francisco Otero-Ferrer

Francisco is a Marine Sciences PhD working at ABAS NGO (Asociación Biodiversidad Atlántica y Sostenibilidad - Spain), and an associate researcher of IU-ECOQUA (University Institute of Sustainable Aquaculture and Marine Ecosystems at the ULPGC). His current research focuses on the functioning of different 'ecosystems engineers' species and the effect of environmental drivers affecting benthic communities associated with these ecosystems.

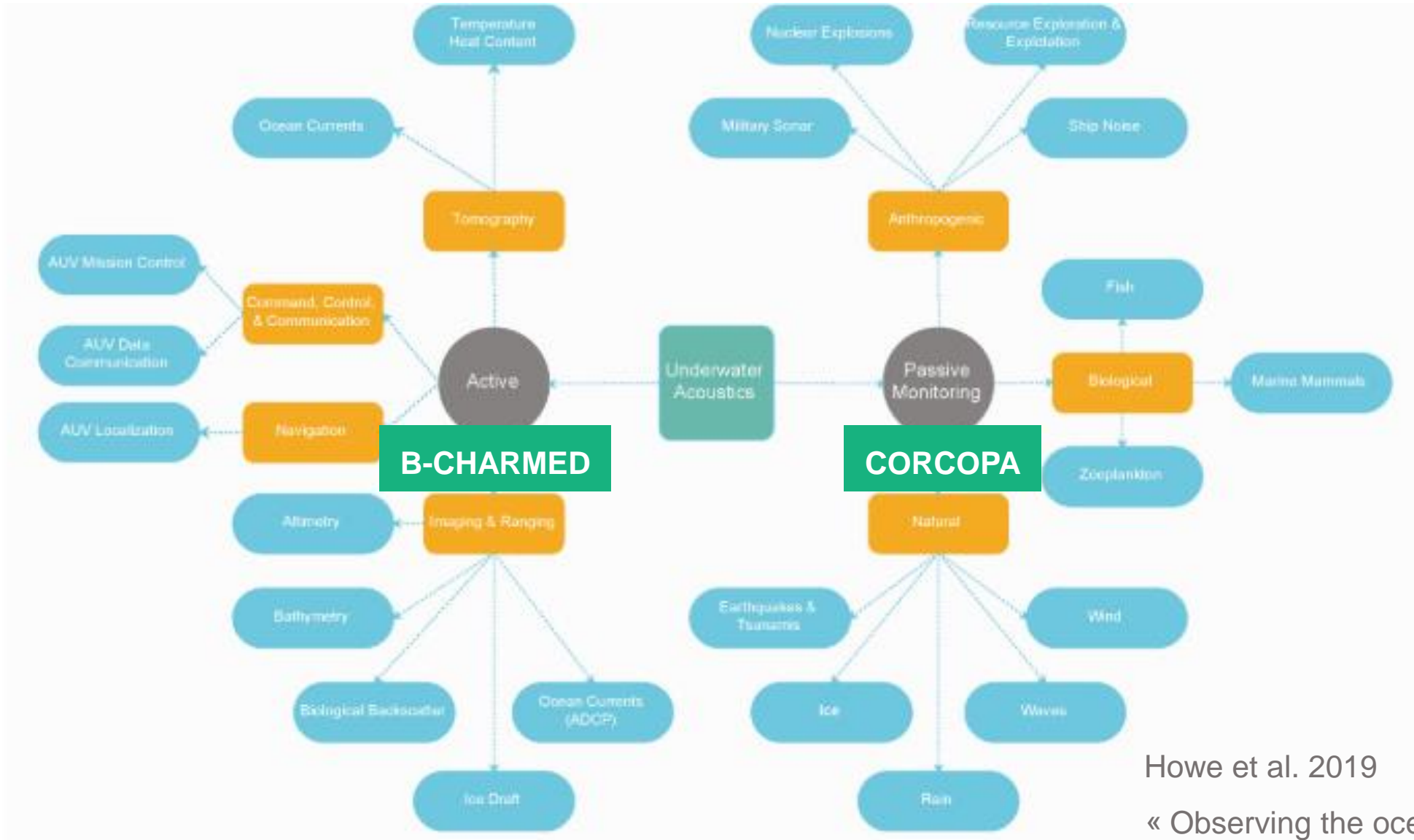




BEST 2.0 CORCOPA

Passive Acoustics to improve the monitoring of Europa Island's coral reef
January 2018 – April 2019

10th of December 2020



Howe et al. 2019

« Observing the oceans acoustically »

BEST
VOLUNTARY SCHEME
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS



VITAL SITES
THE JOURNEY TO MARSEILLE

presented by



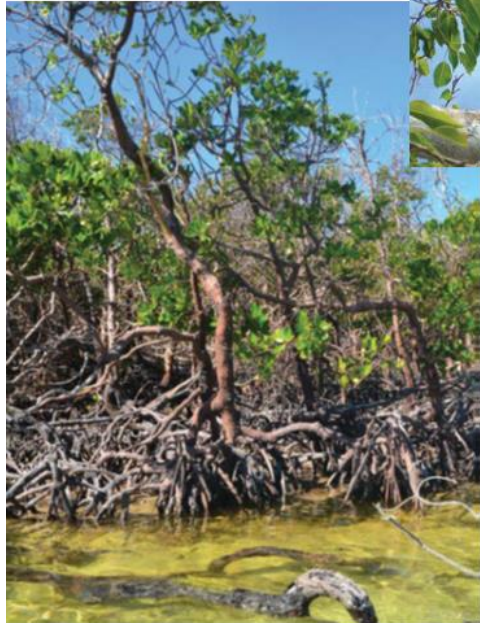
EUROPA ISLAND

A conservation
challenge



- Terres Australes et Antarctiques Françaises (TAAF)
- Southern Mozambique Channel
- 30 km² - 300 km from the nearest human population

Its isolation is both an **opportunity** and a **conservation challenge**



Sanctuary for seabirds, diversity of habitats, green turtle nesting, ...

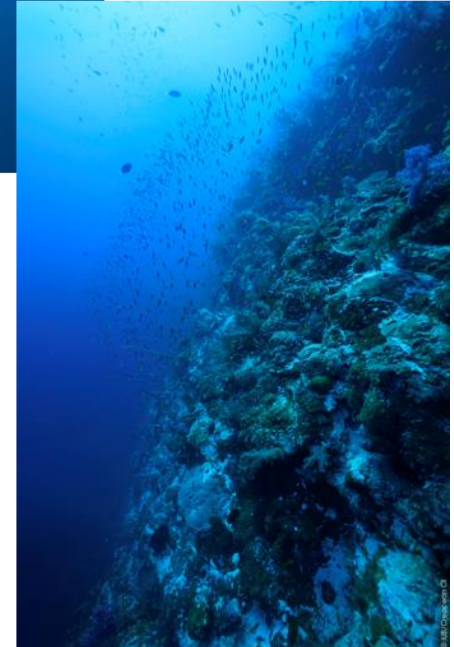
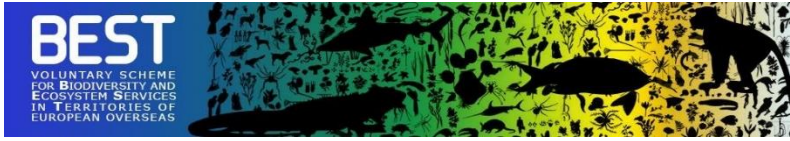


Permanent conservation agent



Regular monitoring





Among the few percents of the world's best preserved coral reefs



No marine facilities (boat, diving, ...)



3 punctual visual surveys in the last 10 years





Increase of disturbances related to climate change



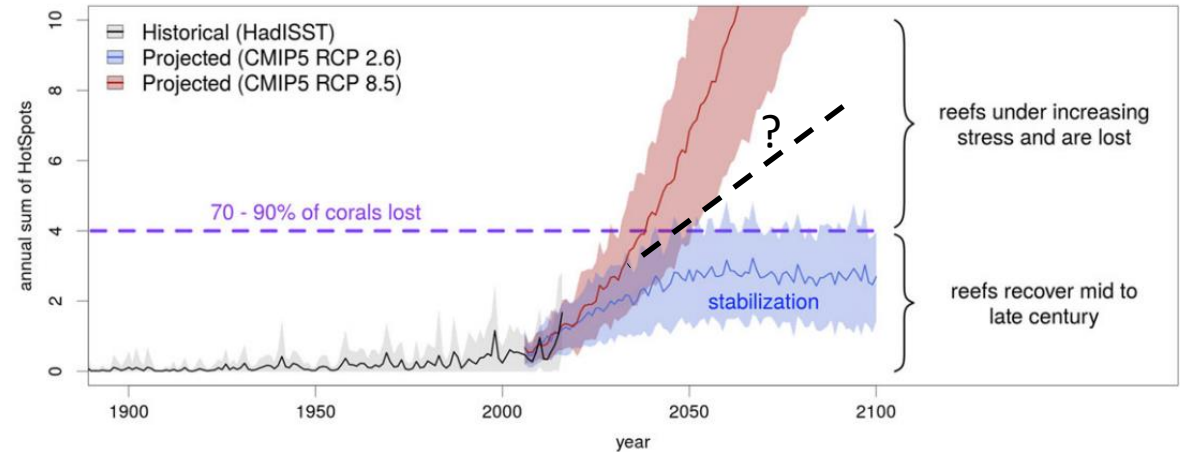
Much more frequent surveys are needed



BEST 2.0 CORCOPA

Strengthen the capacities of Europa Island manager (TAAF) for coral reef conservation, with an operational monitoring tool

- 1- Define an **eco-acoustic baseline** = establish links between acoustic metrics and key ecosystem functions
- 2- Ensure the **continuous monitoring** of Europa's reef soundscape during and after the project
- 3- Contribute to the **management plan** with acquired knowledge



Evolution of thermal anomalies. Beyer et al. 2018

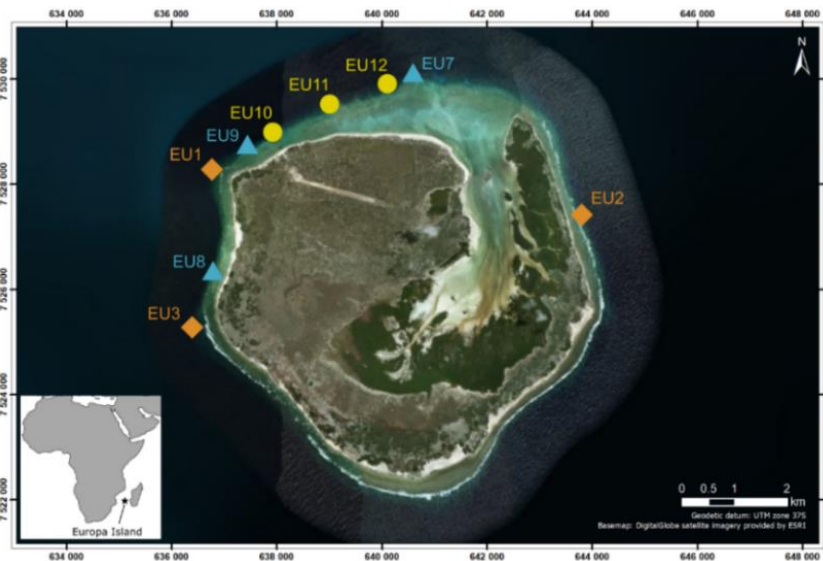
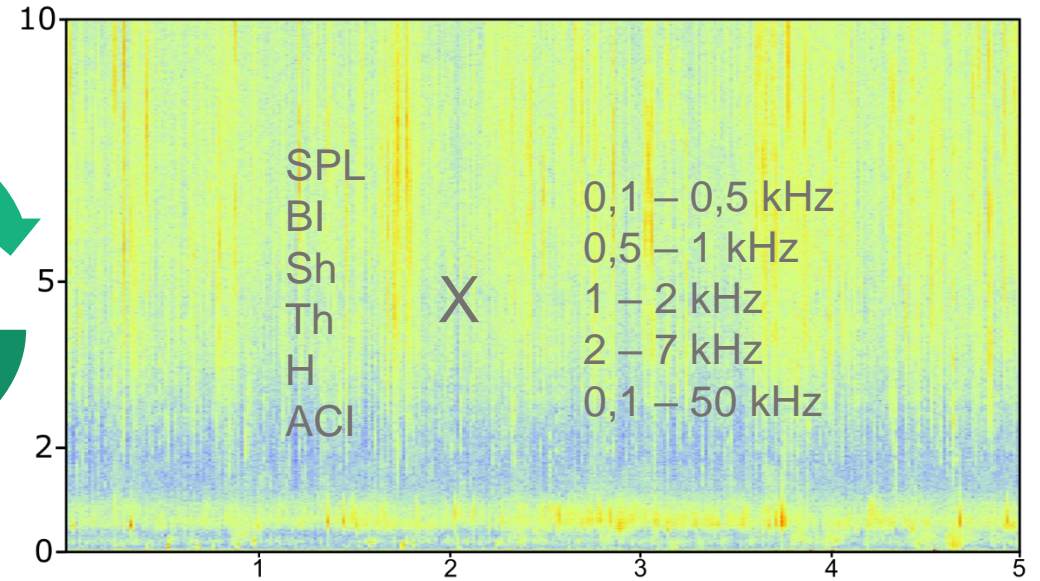
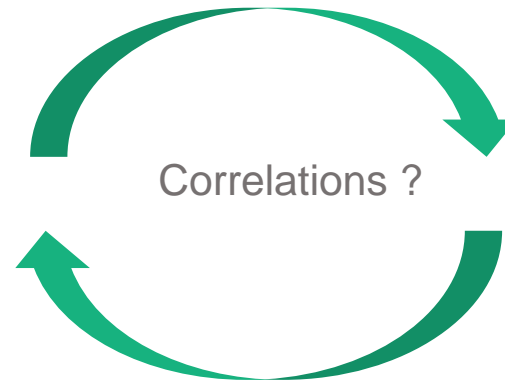
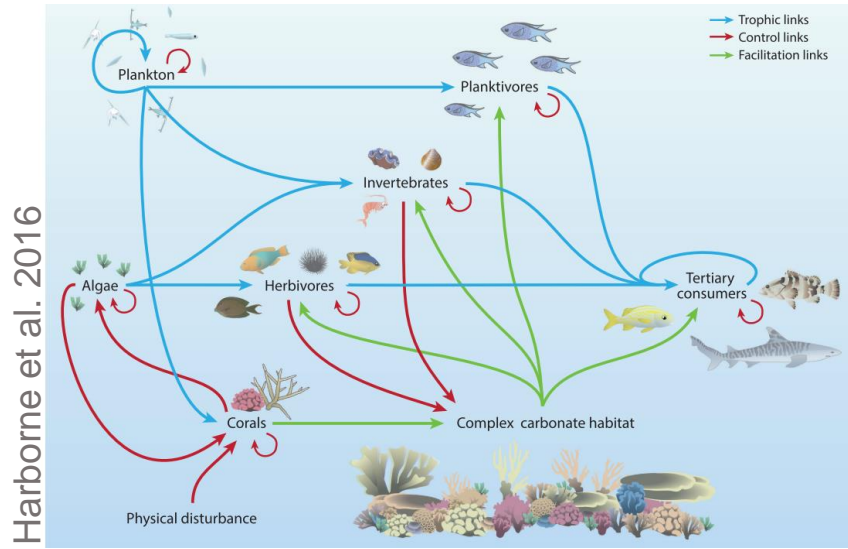


CORCOPA

Result 1:

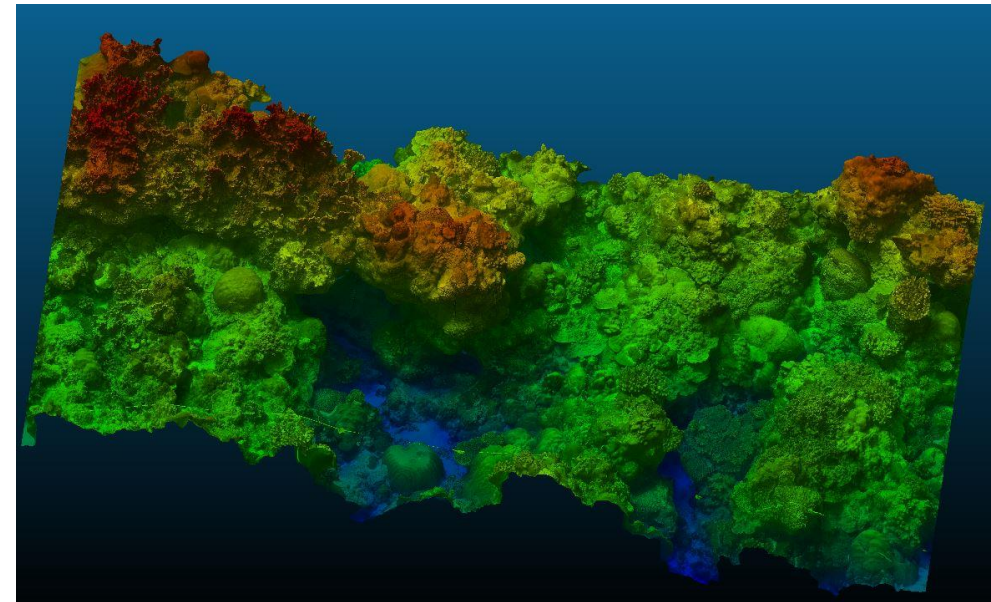
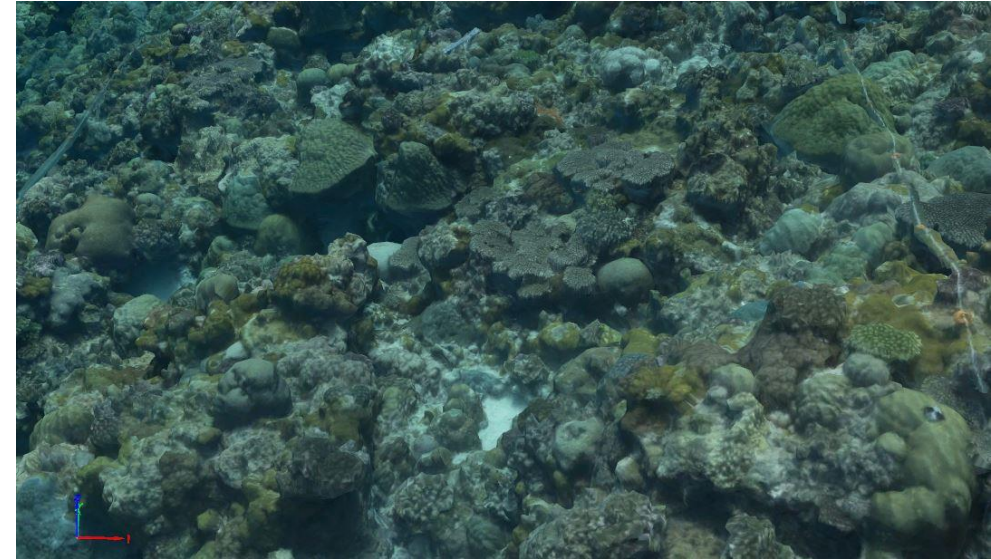
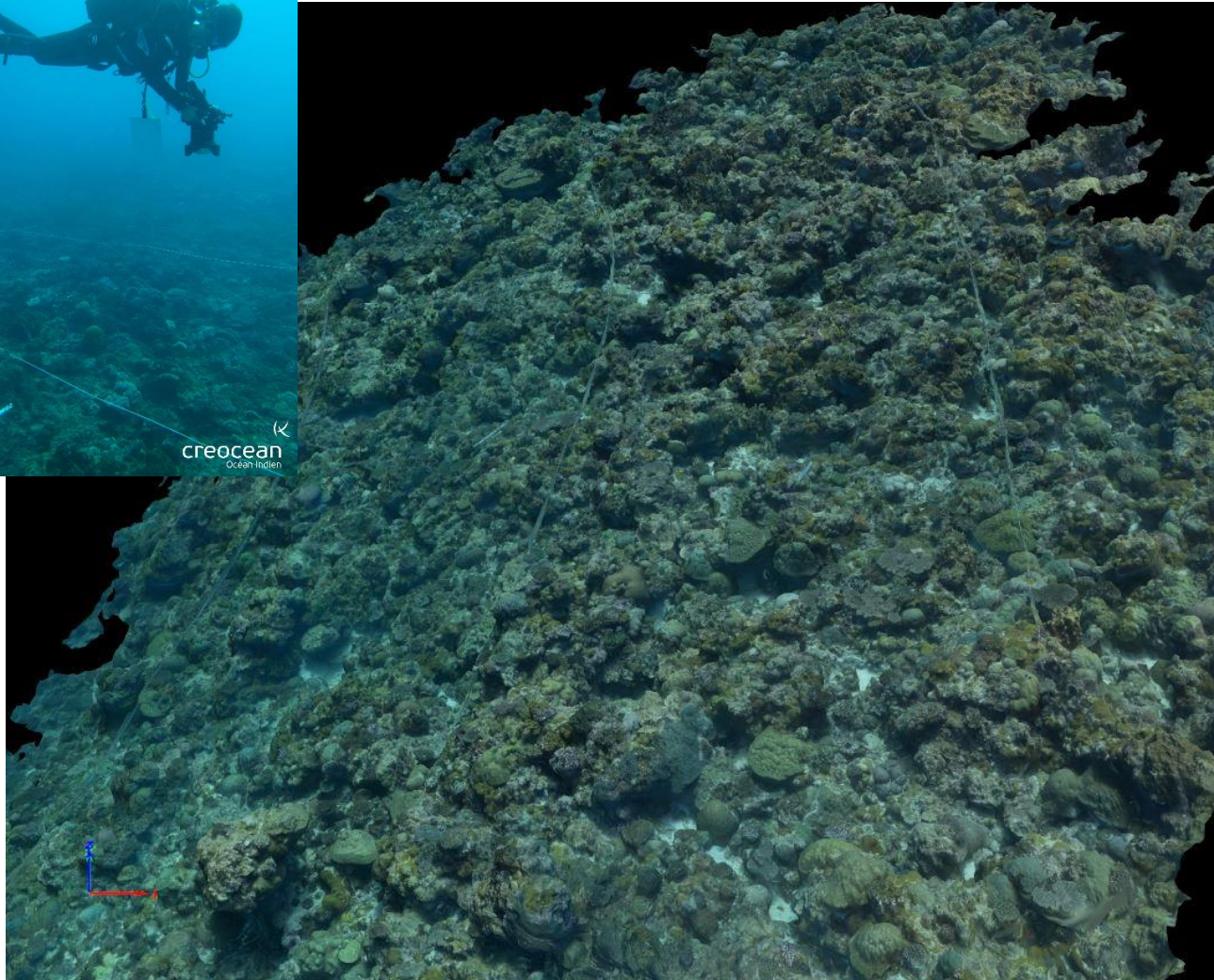
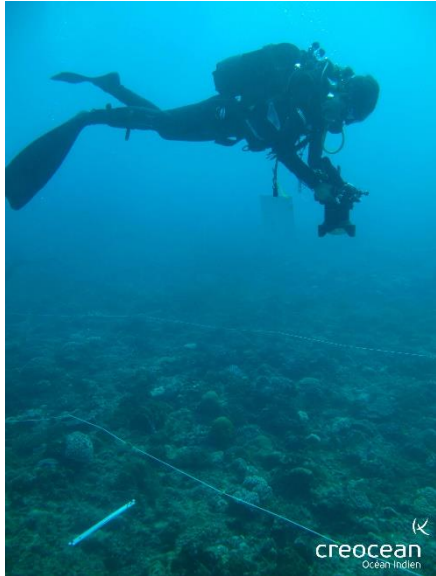
An eco-acoustic baseline

Interpretation key for upcoming continuous monitoring



⇒ Simultaneous **visual** and **acoustic** monitoring of 9 sites around Europa Island

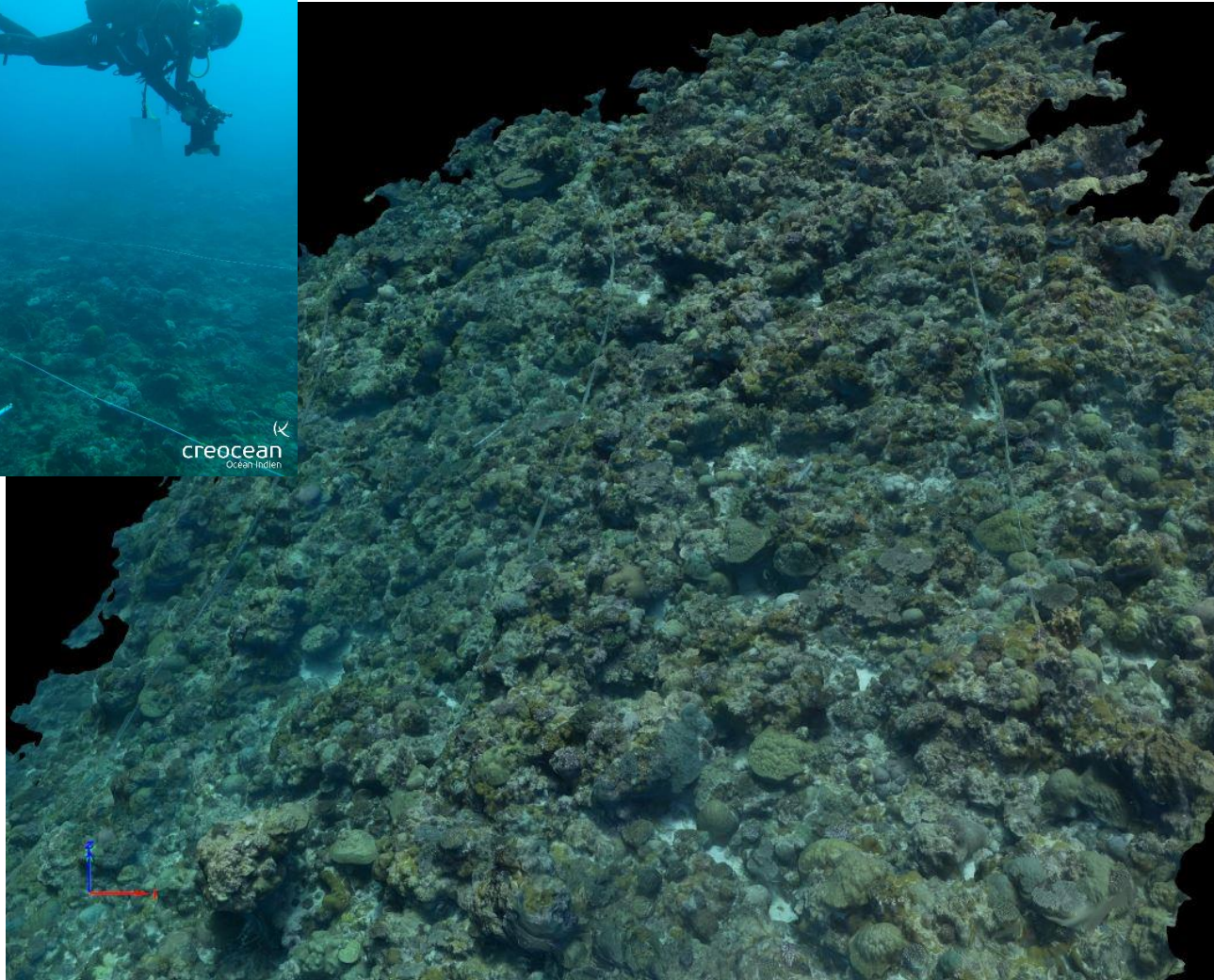
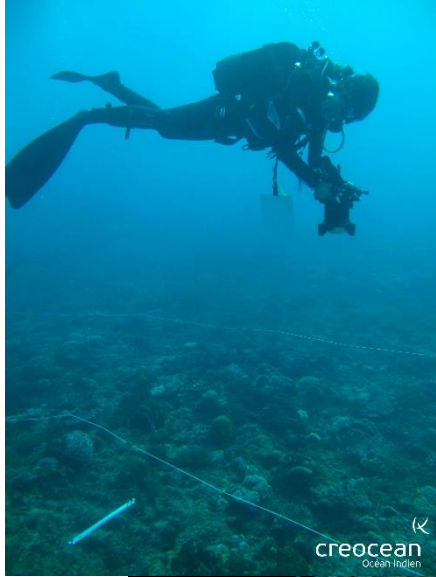
Photogrammetric 3D modeling



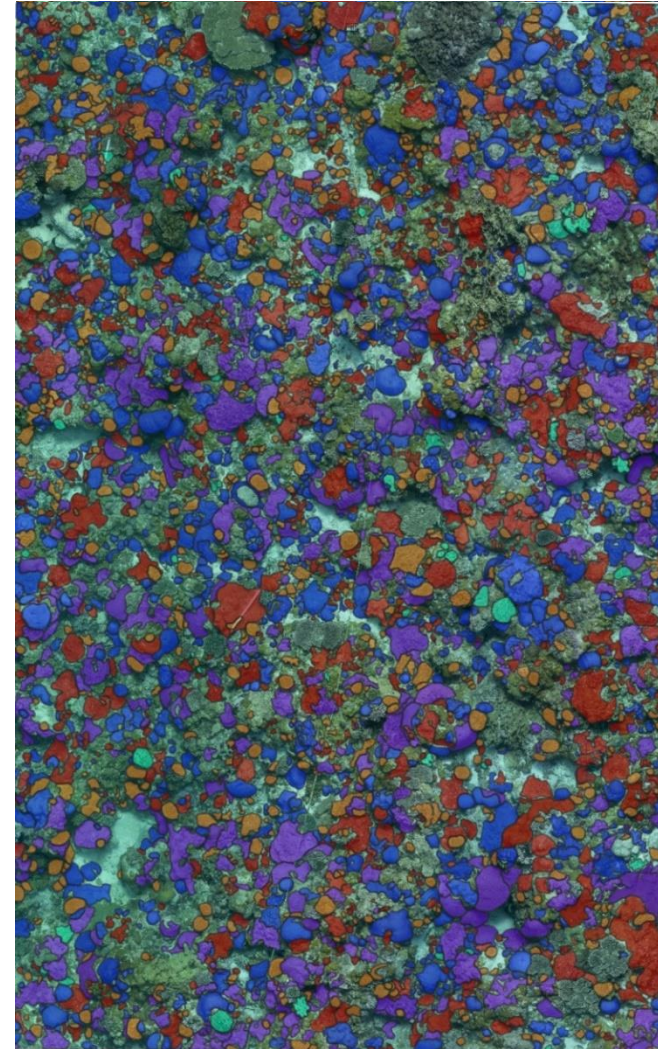
Partnership with Isabel Urbina-Barreto's PhD program

Habitat complexity

Photogrammetric 3D modeling



orthomosaics 150 m²



% cover :

- encrusting corals



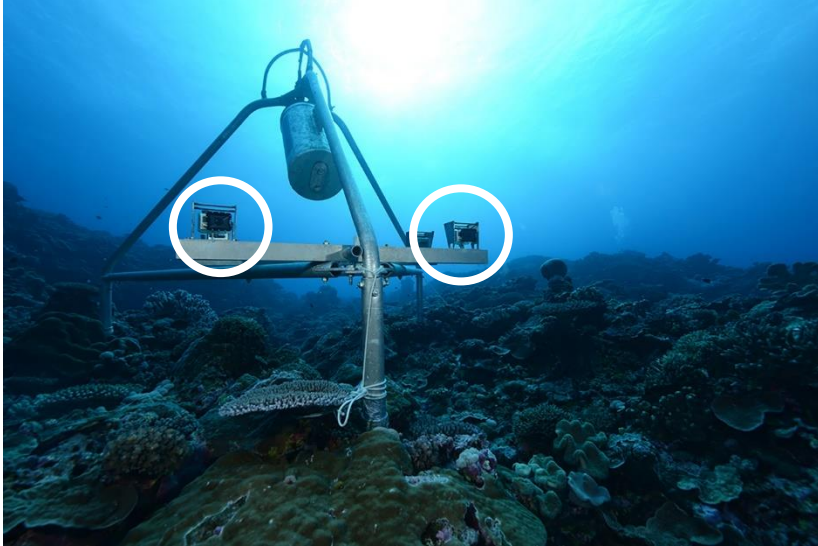
- complex corals



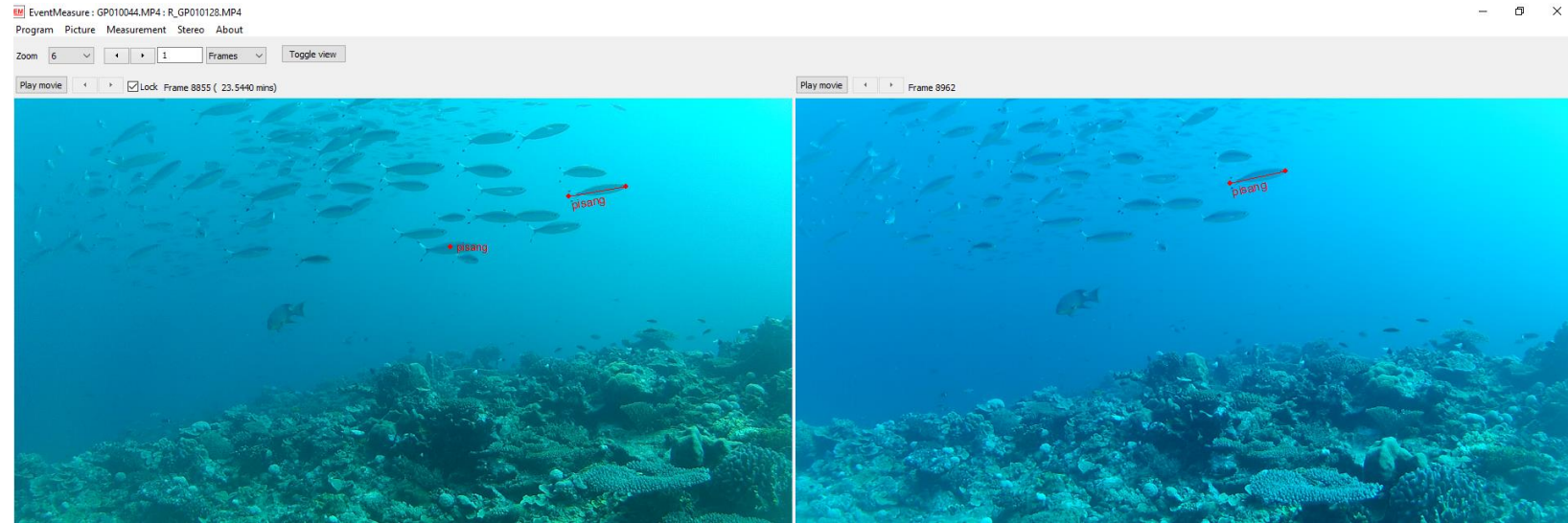
Partnership with Isabel Urbina-Barreto's PhD program



3 FISH-RELATED FUNCTIONS: 90min video footage of fish assemblages → stereo-cameras



© IRD/Eric Folcher

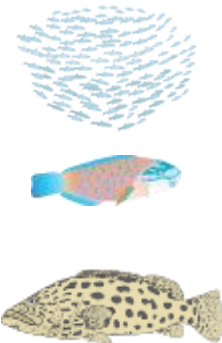


Family	Genus	Species	MaxN	Has fed	Filename	Frame	Time (mins)	Period	Period time (mins)	Lengths, 3D pts, total
Acanthuridae	Ctenochaetus	striatus	1	No	GOPR0044.MP4	5752	3.8347			1, 0, 1
Acanthuridae	Naso	brevirostris	2	No	GP070044.MP4	6309	127.6907			
Acanthuridae	Naso	caesius	3	No	GOPR0044.MP4	12265	8.1767			3, 0, 3
Acanthuridae	Naso	lituratus	2	No	GP010044.MP4	939	18.2667			1, 0, 1
Acanthuridae	Naso	unicornis	1	No	GP070044.MP4	7142	128.2460			
Balistidae	Balistapus	undulatus	1	No	GOPR0044.MP4	6865	4.5767			1, 0, 1
Balistidae	Balistoides	conspicillum	1	No	GP050044.MP4	15579	98.5893			
Balistidae	Sufflamen	bursa	2	No	GP050044.MP4	3050	90.2367			2, 0, 2

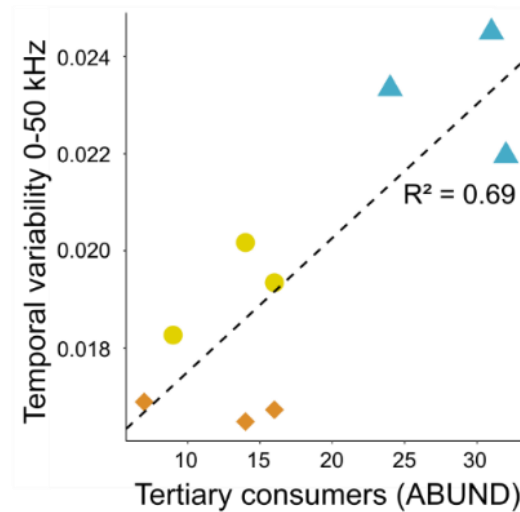
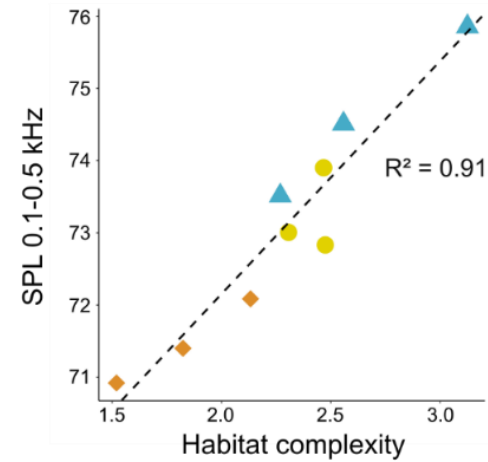
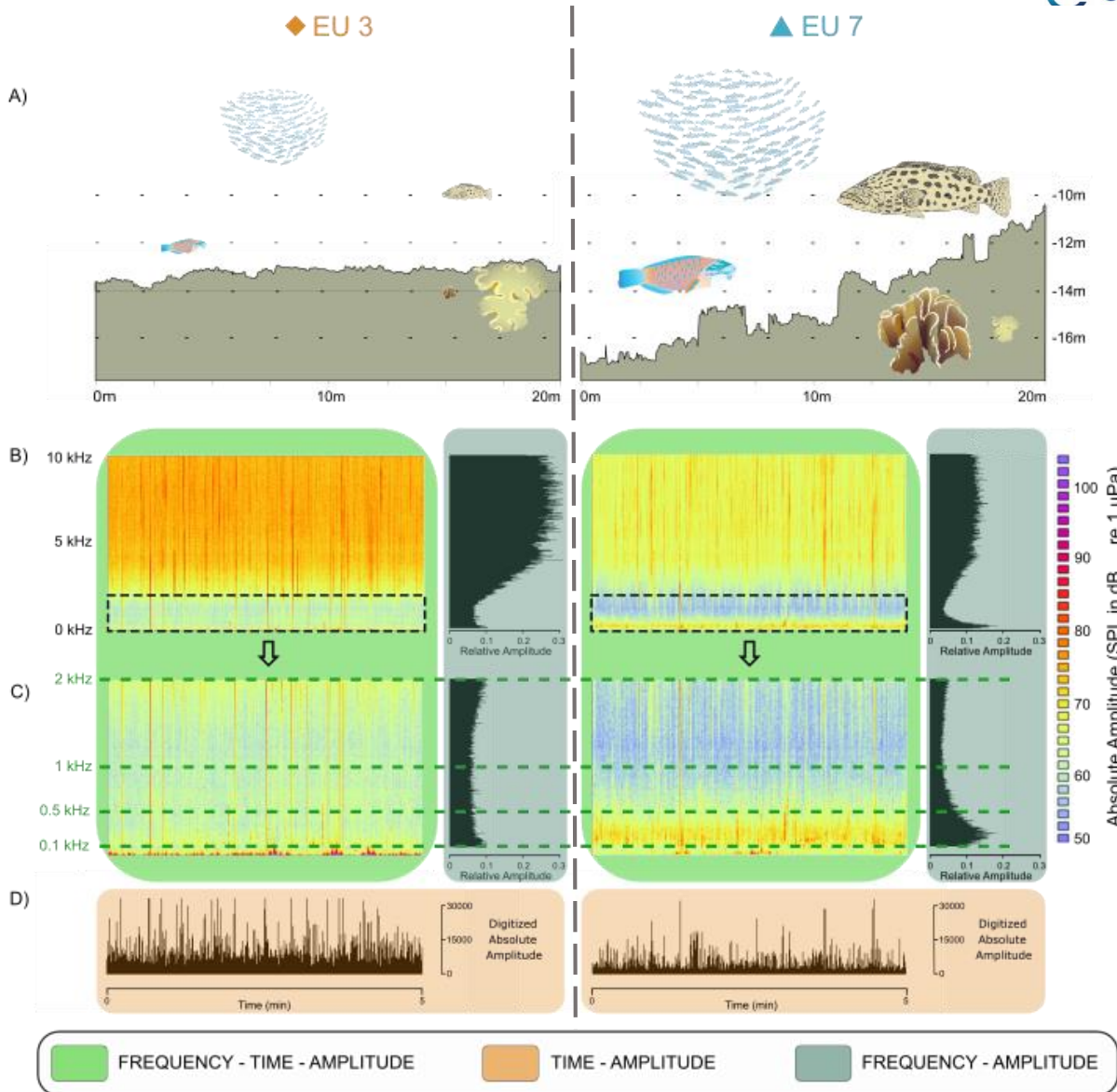
Diversity
Abundance
Biomass

within key functional groups:

- planktivores
- herbivores
- predators



SOUNDSCAPES: 2h simultaneous recording



Complex Habitat



- shelter for diverse and abundant organisms producing low frequency sounds [Freeman & Freeman 2016](#)



- amplification by cavities [Lugli 2012](#)



high amplitude in lower frequencies

Predators



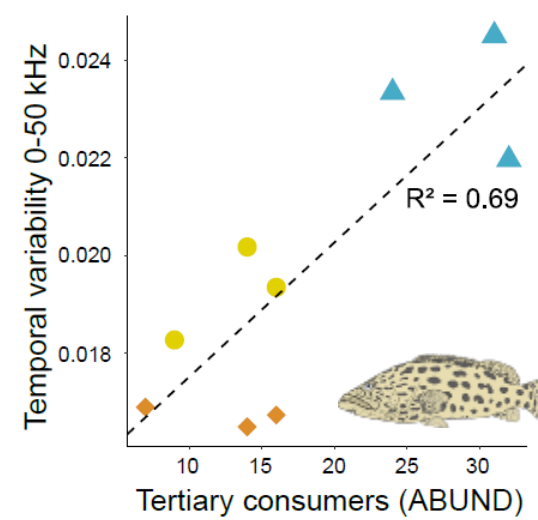
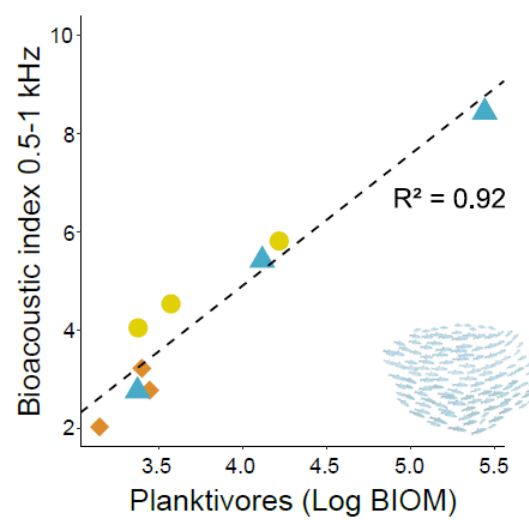
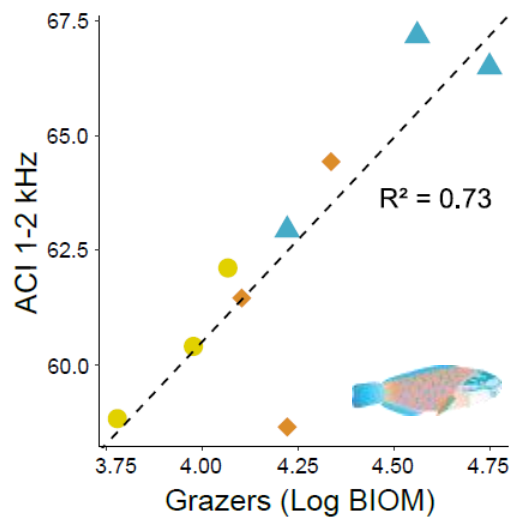
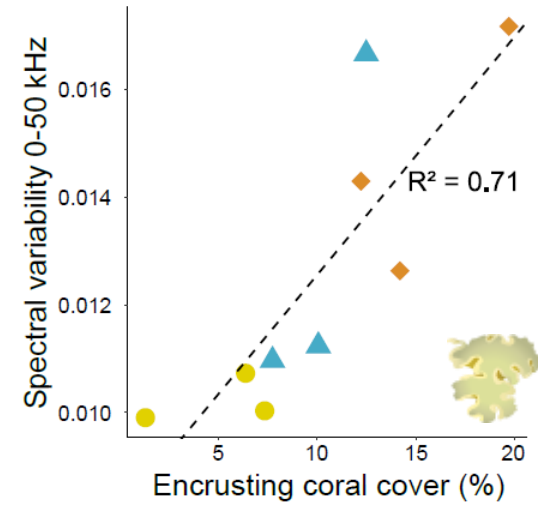
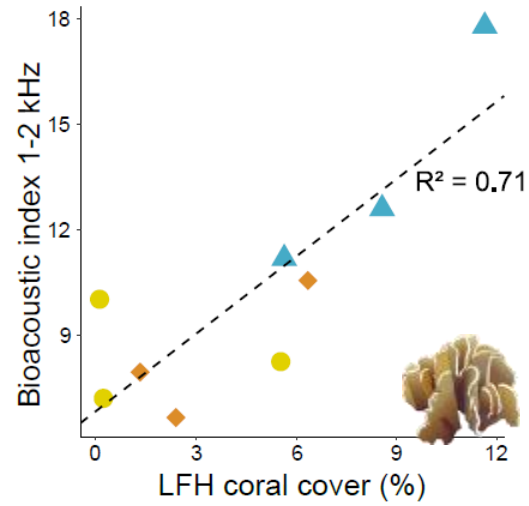
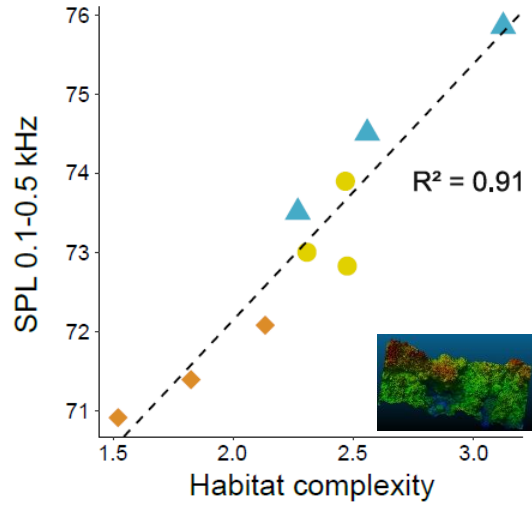
- target sites where numerous acoustic events (= preys ?)



- chasing activity



high temporal variability





CORCOPA

Result 2:

Continuous monitoring

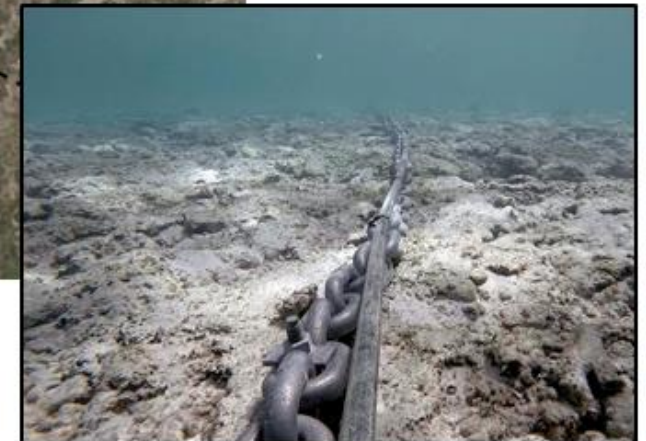
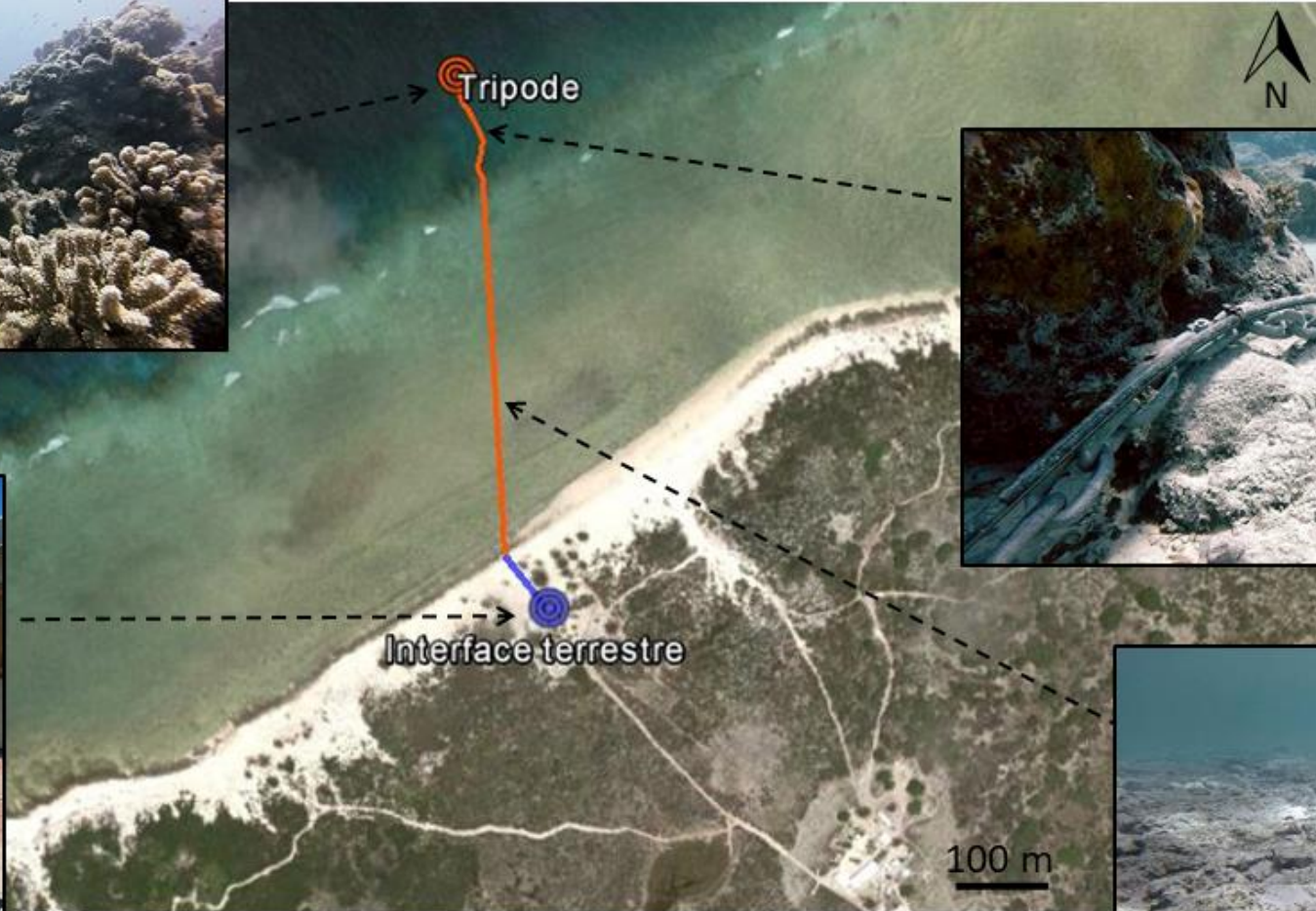
BEST

VOLUNTARY SCHEME
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS



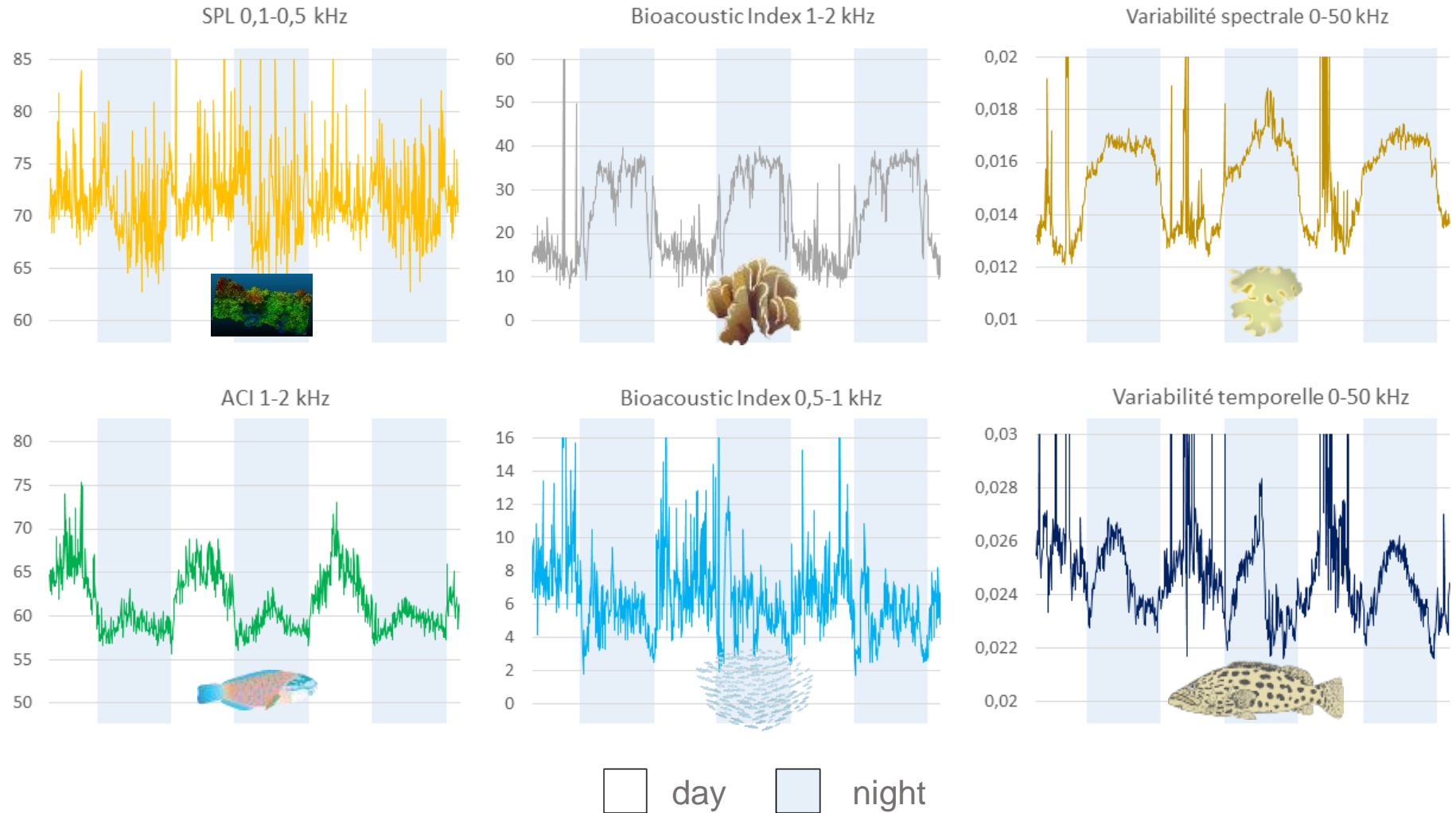
VITAL SITES
THE JOURNEY TO MARSEILLE

presented by



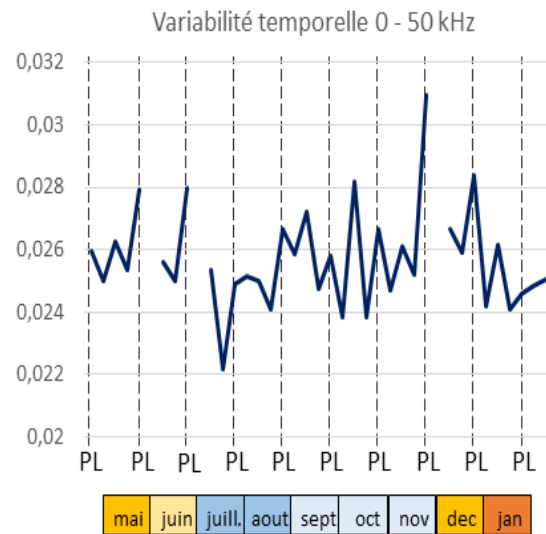
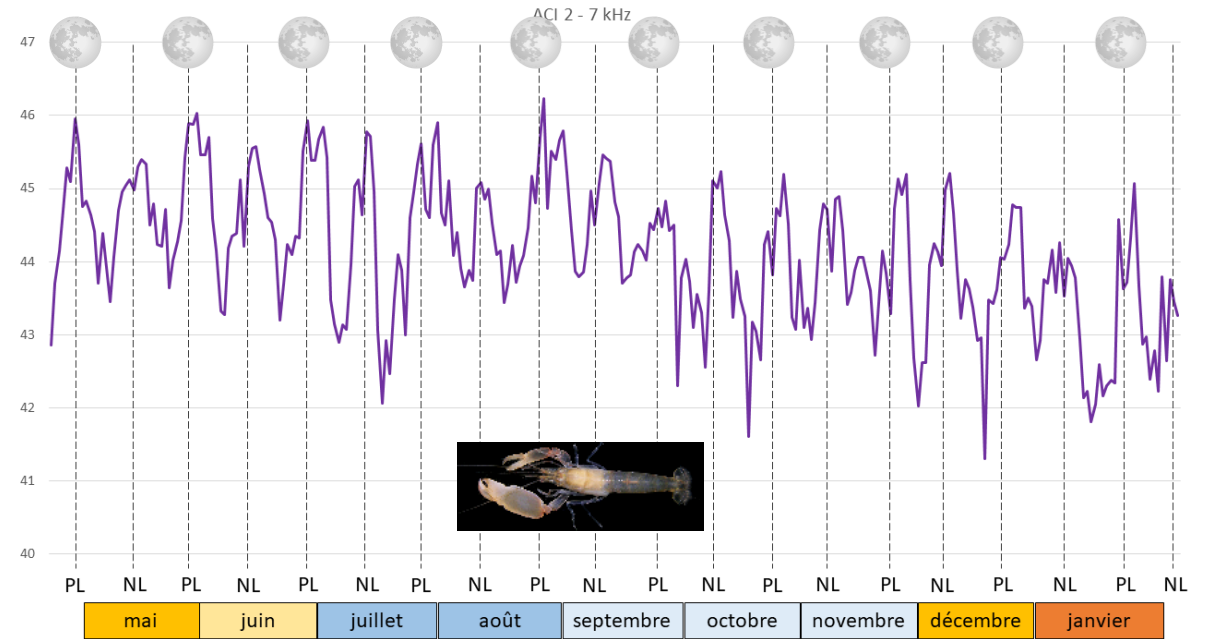
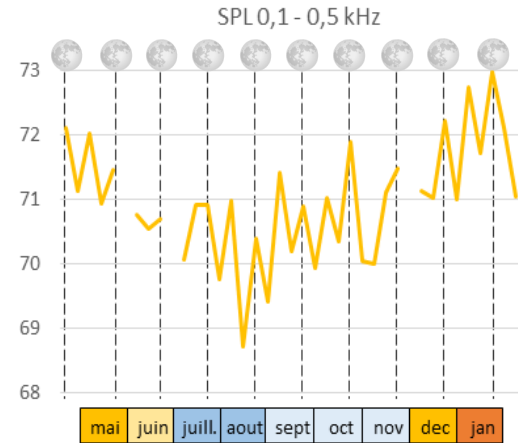
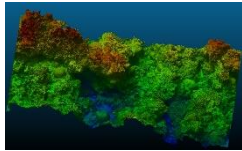
• Variability of the 6 eco-acoustic indices at various temporal scales ?

1. during 72h



- Variability of the 6 eco-acoustic indices at various temporal scales ?

2. From April 2018 to February 2019



➡ Taking the pulse of Europa's coral reef



- Variability of scraping intensity ?

Key process ensured by parrotfishes

More than 4,600 events identified

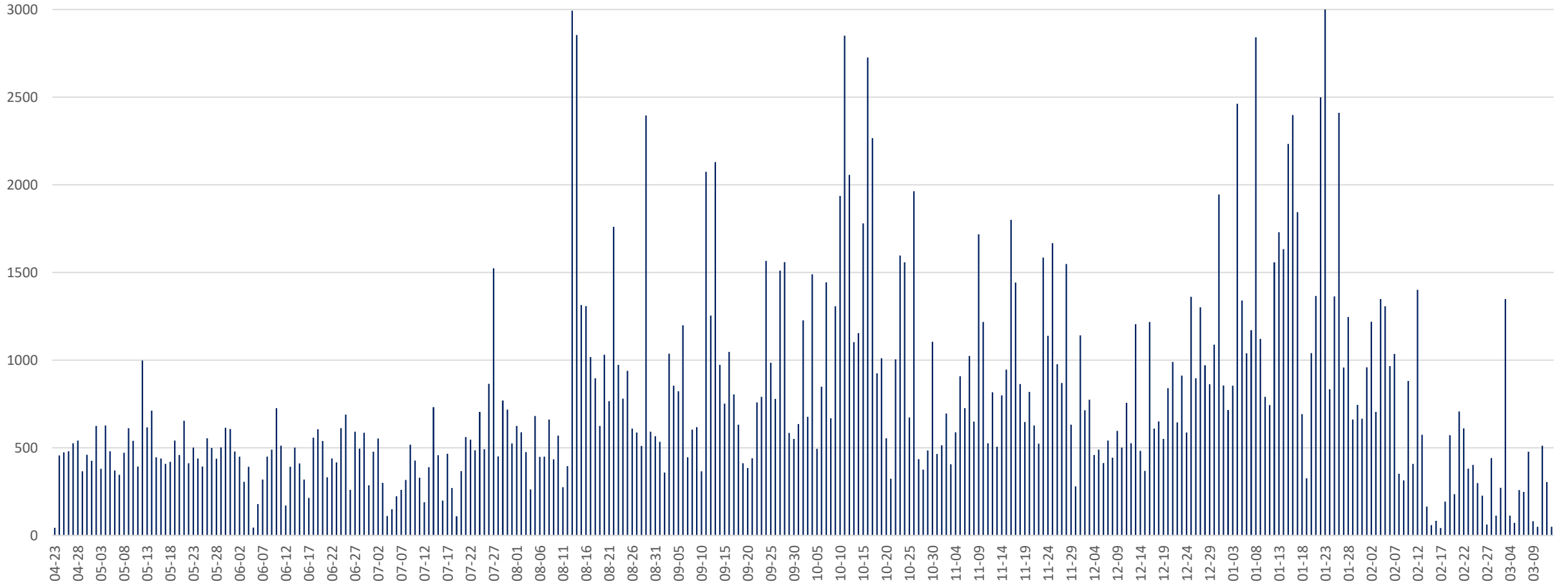
Development of a classifier

Application on a nearly 1-year dataset

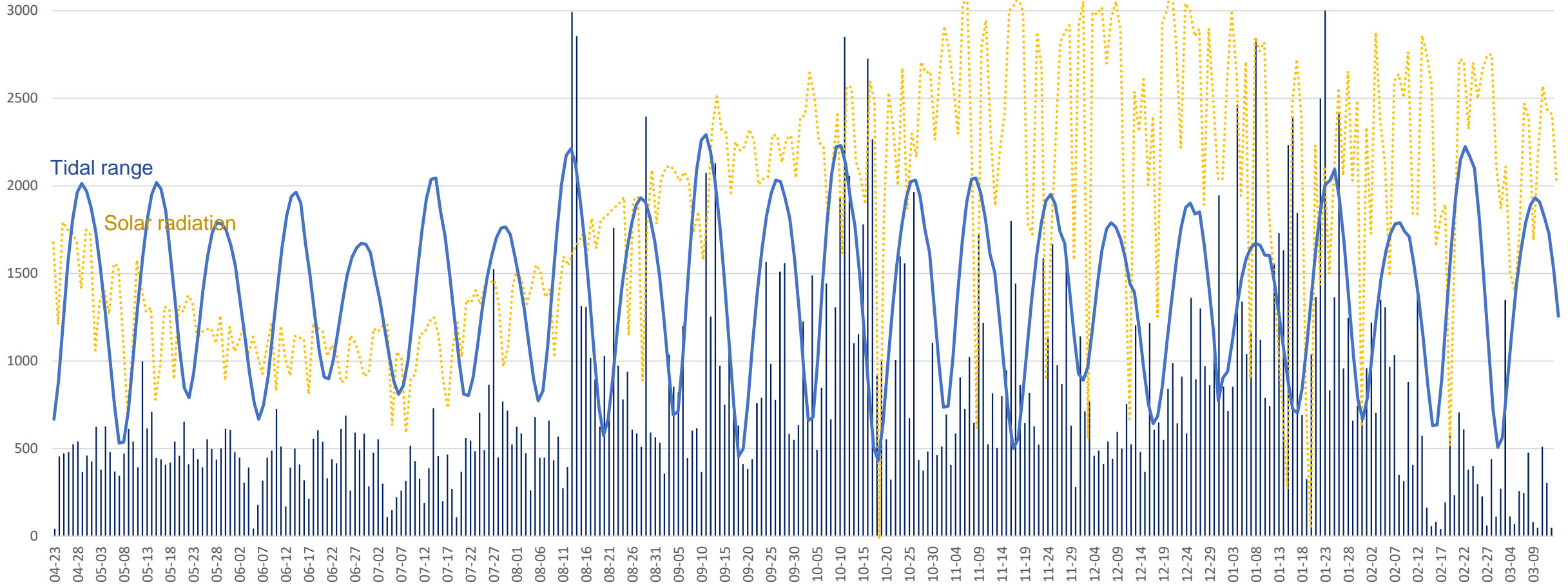




Daily detections from 23th April 2018 to 13th March 2019



Daily detections from 23th April 2018 to 13th March 2019



Strong relationships with **environmental data**
(solar radiation, tidal range, day length, ...)



Detection of **disturbances**
Dynamic of **resilience**, e.g. after a bleaching event



CORCOPA

Result 3:

Contribution to Europa

Island's reef management



Ecoacoustic monitoring:

- New information about the **temporal dynamics** of Europa Island's coral reef
 - global functioning (ecoacoustic indices)
 - scraping intensity (automated detection)

Diurnal and lunar cyclicities
Seasonal trend

⇒ detection of **disturbances**

⇒ monitoring and understanding of the **ecosystem's response**

⇒ identification of **specific periods of activity** (e.g. spawning aggregations, ...)

- Complementary information to visual surveys

⇒ **fill in the gap** between 2 snapshot surveys

⇒ more **holistic approach** = « soundscape »
e.g. snapping shrimps



Objectives of the management plan of Europa Island's coral reef:

- maintain the functioning of coral reef ecosystems
- conserve cetaceans
- develop a monitoring network
- improve knowledge about biodiversity and habitats
- contribute to a baseline scientific observatory
- manage touristic activities to limit their impact
- make monitoring tools more readable
- inform and raise awareness
- ...



- Ecoacoustic monitoring to
- facilitate the orientation of management measures
 - monitor the efficiency of these measures

BEST
VOLUNTARY SCHEME
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS



VITAL SITES
THE JOURNEY TO MARSEILLE

presented by



CORCOPA

Limits & Perspectives



Material limits:

- Long computing time on a standard computer (indices calculation and automated detection)
 - ↳ need to use a calculator to rapidly produce the information for management
- System vulnerability (i.e. 600m cable damaged by a cyclone)
 - ↳ difficult to plan a sufficiently long intervention at Europa Island to repair
 - ↳ system simplification ?

Limits in the transmission to managers

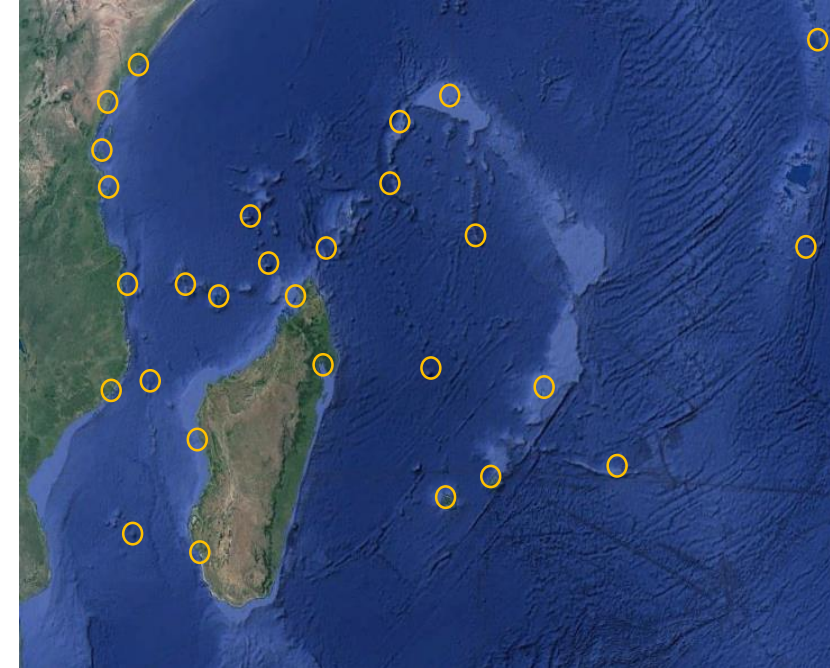
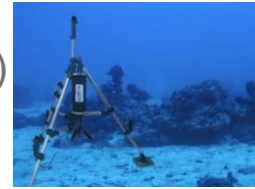
- ↳ Field agents ensured system maintenance and data collection
= 324 days continuous recording
- ↳ Office agents were not able to implicate: need for a fully automated handling process
= a few « clicks » from uploading raw data to producing graphics



Perspectives:

PAM = opportunity to create **standardised monitoring networks** at large spatial scales

↳ Replicate CORCOPA with multiple conservation actors (MPAs, NGOs, ...)

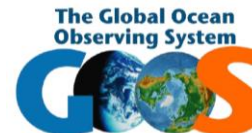


- 6-months **autonomous recorders** (SD cards + rechargeables batteries) easy to deploy or re-collect in a 5min dive
- **automated data handling** (calculator centralized at the regional scale ?)
AND/OR
easy-to-use **data handling interface** (from data backup to graphics production)
- development of **automated detection** (e.g. boat, cetaceans, ...)

- supply data to **Regional Information Systems**



- integration of acoustic metrics to **international dashboards**



(EOV « Ocean Sound »)





UMR ENTROPIE

IRD UNIVERSITÉ DE LA RÉUNION ifremer CIRIS UNC

ENTROPIE ACCUEIL ACTUALITÉS RECHERCHE FORMATION EQUIPE RESSOURCES CONTACT



© Eric Folcher / IRD



Conservation Optimisée des Récifs Coralliens d'EurOPa par l'éco-Acoustique

Durée : janvier 2018 – décembre 2018 (12 mois)

Organisation pilote : Université de La Réunion

<http://umr-entropie.ird.nc/index.php/portfolio/projets-termines/projet-corcopa>



VITAL SITES

THE JOURNEY TO MARSEILLE

presented by



PANORAMA



Découvrez - A propos - Ressources + Soumettez une solution En Fr Es

Snapshot Solution

CORCOPA - Optimized Conservation of Europa's Coral Reefs using Ecoacoustics



by [Simon Elise](#)
[Université de la Réunion](#)



Tripod supporting the hydrophone at 12m depth on Europa's reef: data collection. CORCOPA project, funded by the European Commission (DG DEVCO) through the BEST 2.0 program, with support of The French Southern and Antarctic Lands ; Europa Island, TAAF.
© Armand Daydé

Publié: 23 juin 2020 Dernière modification: 02 octobre 2020 491 Vues

[Login to save to My Favorites](#)

Résumé

The coral reef around Europa island is one of the world's rare reefs that remain in a near pristine condition. Its conservation is both a priority and a logistic challenge due to its remoteness. The frequency of visual surveys (a snapshot every 3 to 5 years) is insufficient to support its effective management. Indeed, accelerating

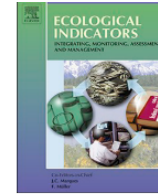
<https://panorama.solutions/fr/solution/corcopa-optimized-conservation-europas-coral-reefs-using-ecoacoustics>



SCIENTIFIC DIFFUSION



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)
Ecological Indicators
 journal homepage: www.elsevier.com/locate/ecolind



Original Articles

Assessing key ecosystem functions through soundscapes: A new perspective from coral reefs

Simon Elise^{1,2,3,*}, Isabel Urbina-Barreto^{1,3,4}, Romain Pinel⁵, Vincent Mahamadaly⁵,
 Sophie Bureau^{1,3}, Lucie Penin^{1,3}, Mehdi Adjeroud^{3,6}, Michel Kulbicki^{3,6},
 J. Henrich Bruggemann^{1,3}

Publication in *Ecological Indicators* 2019



Long-term ecoacoustic monitoring of a pristine coral reef: when data-intensive ecology responds to management objectives

Simon ELISE^{1,2,*}, Marion COUÉDEL¹, Joanna KOLASINSKI³, Sophie MARINESQUE³, Henrich BRUGGEMANN¹
¹ UMR 9220 ENTROPIE, Labex Corail, Université de La Réunion, France; ² NORTEX MEDITERRANÉE, Toulon, France
³ Terres Australes et Antarctiques Françaises (TAAF), La Réunion, France
 * Corresponding author: simon_elise@hotmail.com

Context
 The coral reefs of Europa Island (SW Indian Ocean) are among the few coral reefs that remain in near pristine conditions. Their conservation is both a priority and a logistic challenge due to their isolation.

Material and Methods
 In April 2018, an acoustic monitoring station was installed at 12 m depth. Consecutive 5 min sound samples are recorded at 100 kHz and 16 bits and stored on an external drive. Ecoacoustic indices for marine biodiversity and habitat assessments (Sound Pressure Level and Acoustic Complexity Index) are calculated for several frequency bands. Specific events (e.g., scraping by parrotfish, vessel noise, ...) are also analysed. Learning and classification tools can be developed to respond to management objectives.

Results
Management objective 1: knowledge of the initial state and functioning
 1.1) General acoustic temporal patterns and their ecological interpretation
 ANALYSIS: temporal clustering (see Philippo et al. 2018)
 e.g.: a cluster characterised by high values of SPL_{1.0-1.5kHz}} could indicate a period with high fish activity (see e.g. Kennedy et al. 2010)

Management objective 2: detection of disturbances
 2.1) Automatic detection of vessels frequentation
 ANALYSIS: deep learning
 2.2) Automatic detection of natural disturbances
 ANALYSIS: deep learning

Management objective 3: regulation of human activities to avoid ecological impacts
 e.g. definition of SPL thresholds to be respected by vessels, and control with the permanent monitoring

Management objective 4: implementation of ecosystem conservation and restoration actions to counteract biodiversity and ecosystem functions losses

Conclusions
 Europa island reefs have been surveyed opportunistically using traditional *in situ* visual methods. Such field surveys are accurate but logistically complex and costly, making regular monitoring unfeasible. To understand the natural temporal dynamics of these ecosystems and to evaluate ecosystem responses to intense disturbances (e.g. coral bleaching, hurricanes), field data are required on a regular basis.

References
 1. Philippo YF, Traversy M, Tra P (2018) Rewiring the ecological content of long-duration audio-recordings of the environment through clustering and visualisation. *PLoS ONE* 13(1): e0193845.
 2. Kennedy EV, Hollard MFK, May JM, Guzman HM, Simason SD (2010) Serial patterns in reef-generated noise relate to habitat and communities. Evidence from a Panamanian case study. *Journal of Experimental Marine Biology and Ecology* 395: 85–92.
 3. Green AL and Bellwood DR (2009) Monitoring functional groups of herbivorous reef fishes as indicators of coral reef resilience – A practical guide for coral reef managers in the Asia Pacific region. IUCN working group on Climate Change and Coral Reefs. IUCN, Gland, Switzerland. 70p.

Acknowledgements
 The CORCOPA project is funded by the European Commission, DG DEVCO through the BEST 2.0 Programme.

Poster

International Conference on Ecological Informatics
 Jena, Germany 2018

BEST

VOLUNTARY SCHEME
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS



DOCUMENTARY FILM

- Several projections
- Youtube « CORCOPA »



VITAL SITES

THE JOURNEY TO MARSEILLE

presented by



EXPOSITION



WORKSHOP with children



THANK YOU!



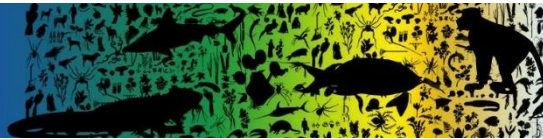
VITAL SITES
THE JOURNEY TO MARSEILLE

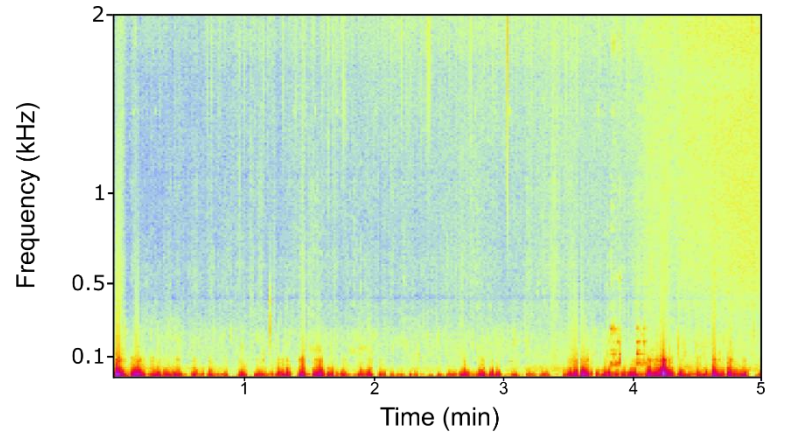
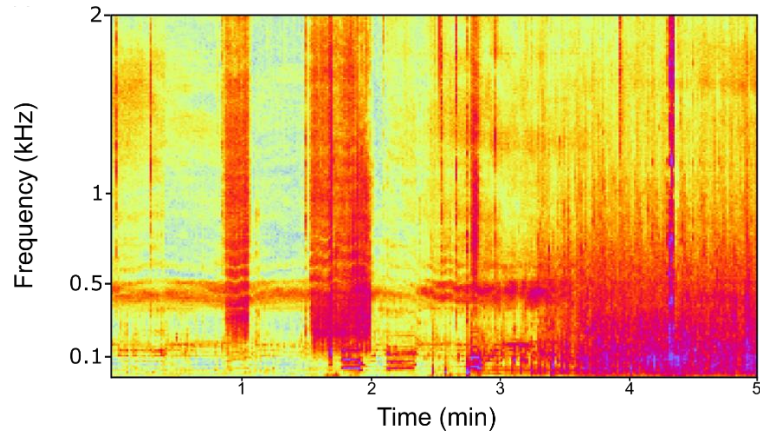
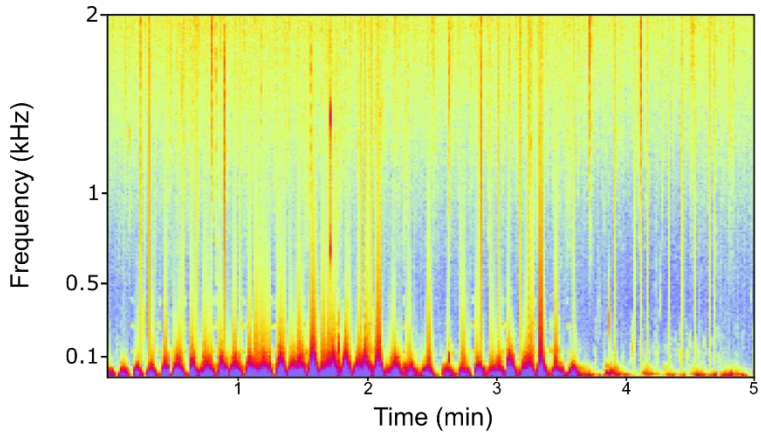
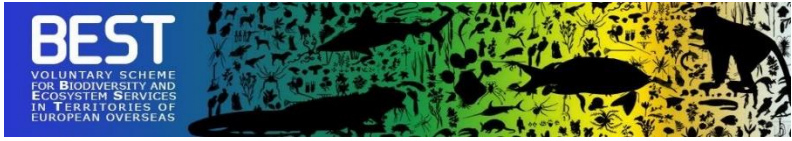
presented by



BEST

VOLUNTARY SCHEME
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS





BEST

VOLUNTARY SCREENING
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS



THE BLACK CORAL FORESTS AS BIODIVERSITY HOTSPOTS IN THE MACARONESIAN REGION: ECOSYSTEM FUNCTIONS AND SERVICES ANALYZED

10th of December 2020



BEST

VOLUNTARY SCHEME FOR BIODIVERSITY AND ECOSYSTEM SERVICES IN TERRITORIES OF EUROPEAN OVERSEAS



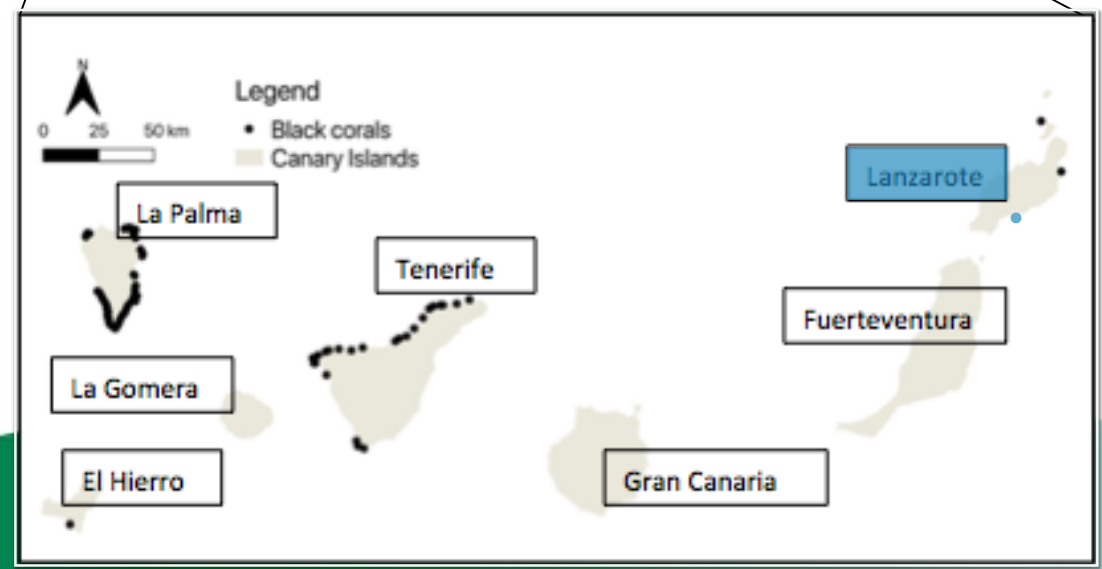
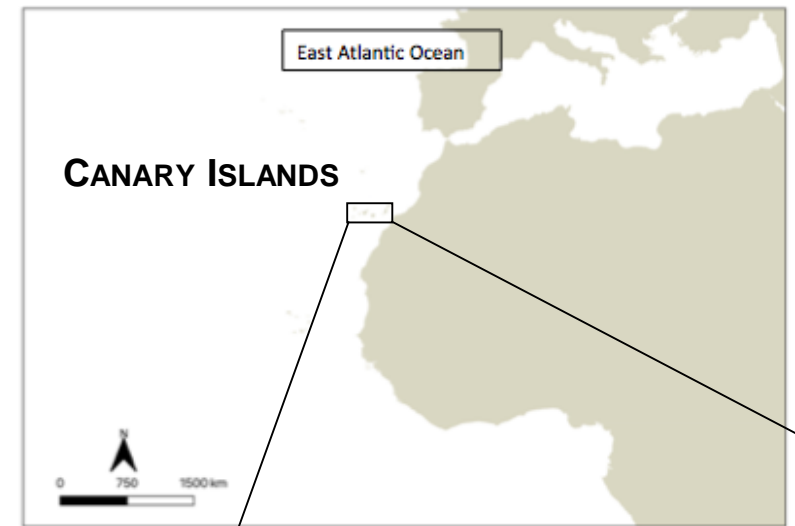
✓ **3 MAIN PARTNERS AND MANY COLLABORATORS**

✓ **13 MONTHS (31/8/2021)**

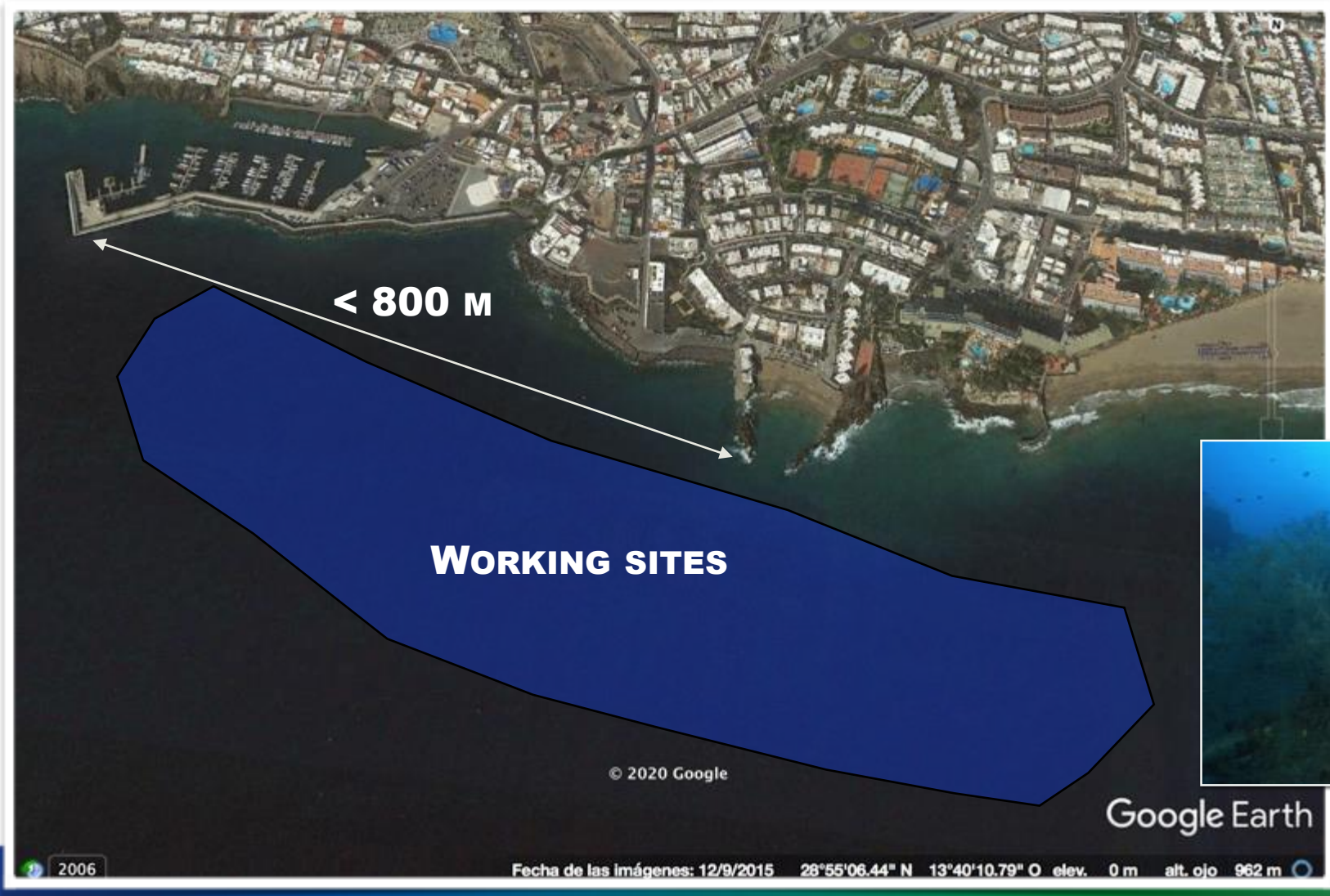
✓ **CA. 49.000€**

✓ **4 ACTIVITIES / 2-3 FIELD EXPEDITIONS**

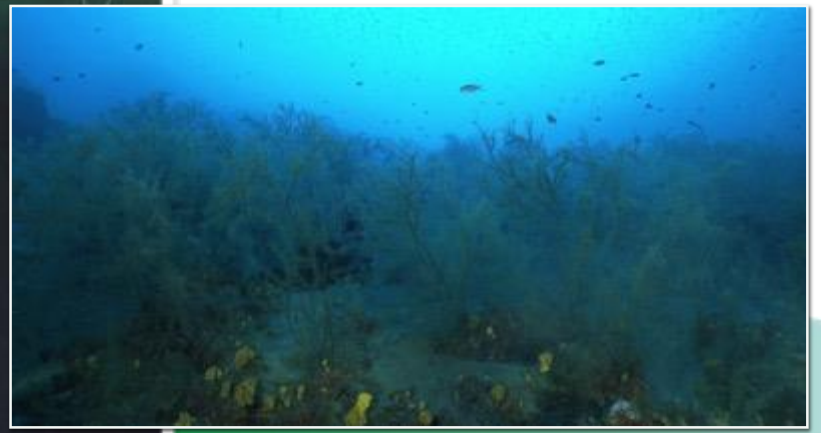
✓ **LANZAROTE (PLAYA CHICA)**

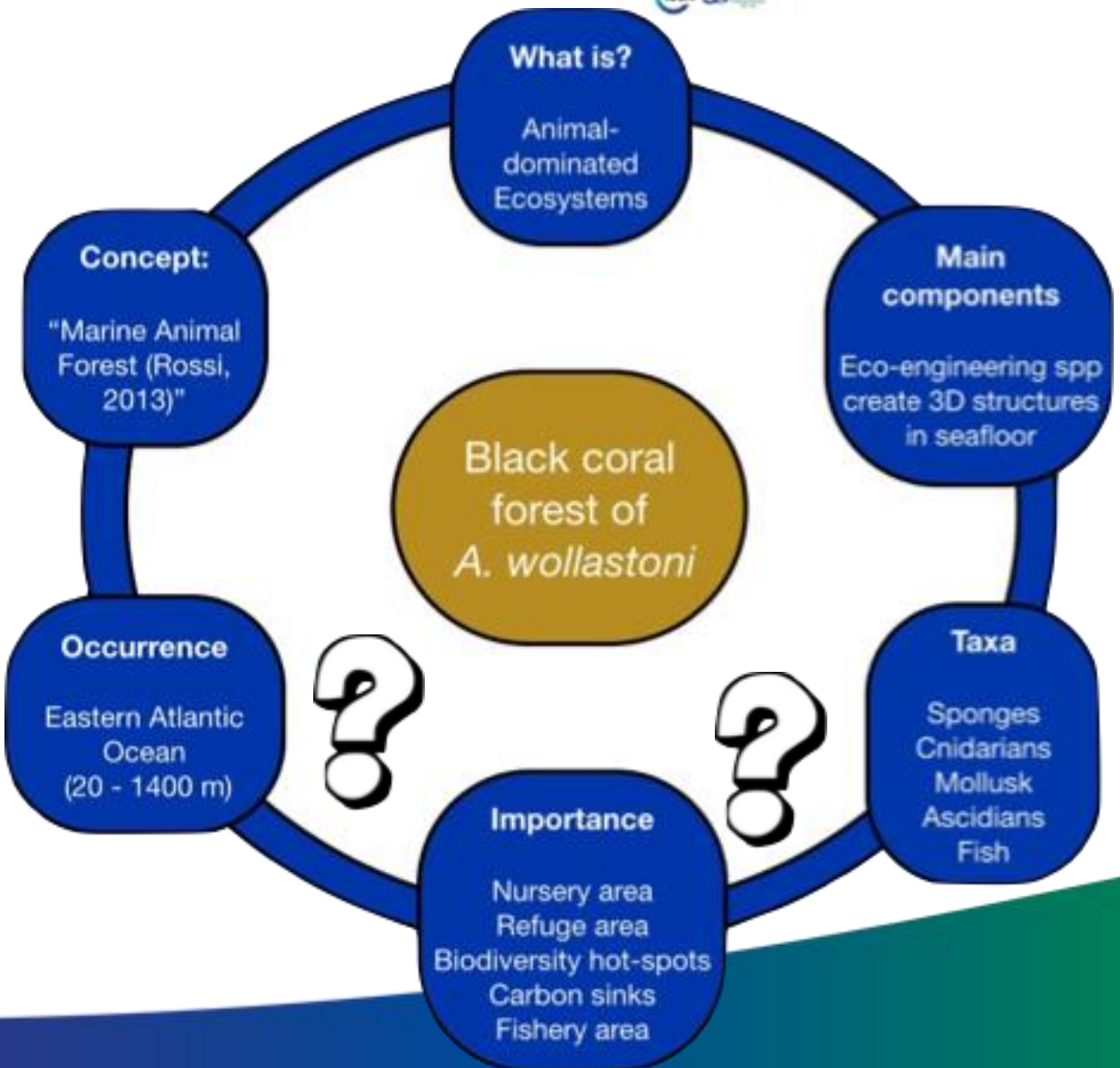


A “NATURAL” LABORATORY



COASTAL DEVELOPMENT





3D STRUCTURES: BIOENGINEERS



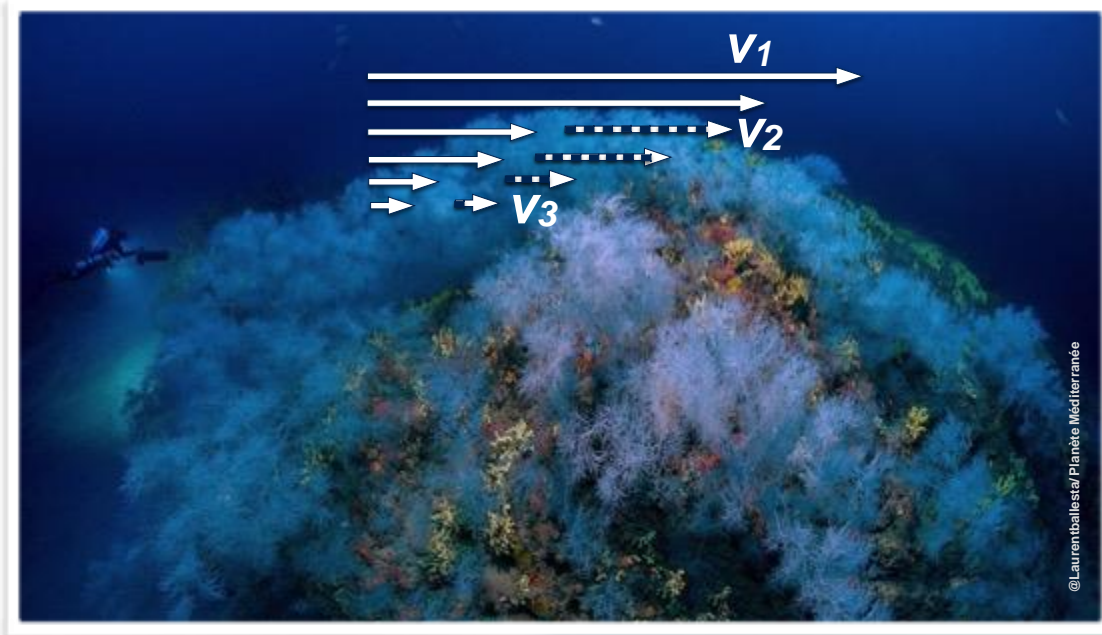
ASSOCIATED BIODIVERSITY



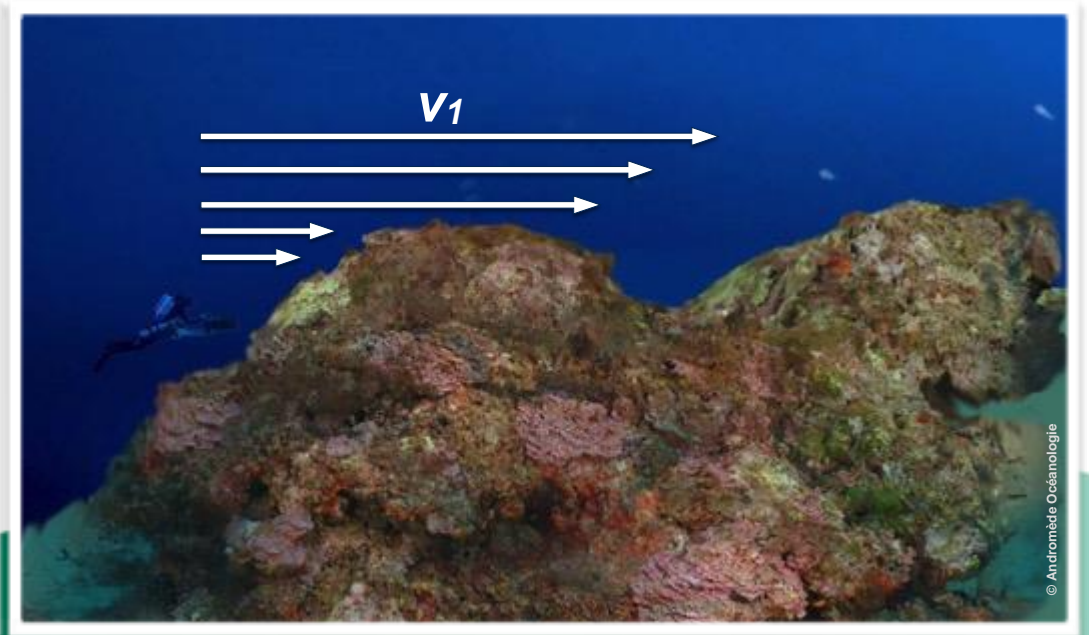


INTERACTION “FOREST STRUCTURE” & “CURRENT FLUX”:

- TURBULENCE EFFECT ($V_1 > V_2 > V_3$) VS STRUCTURE (DENSITY/HEIGHT)



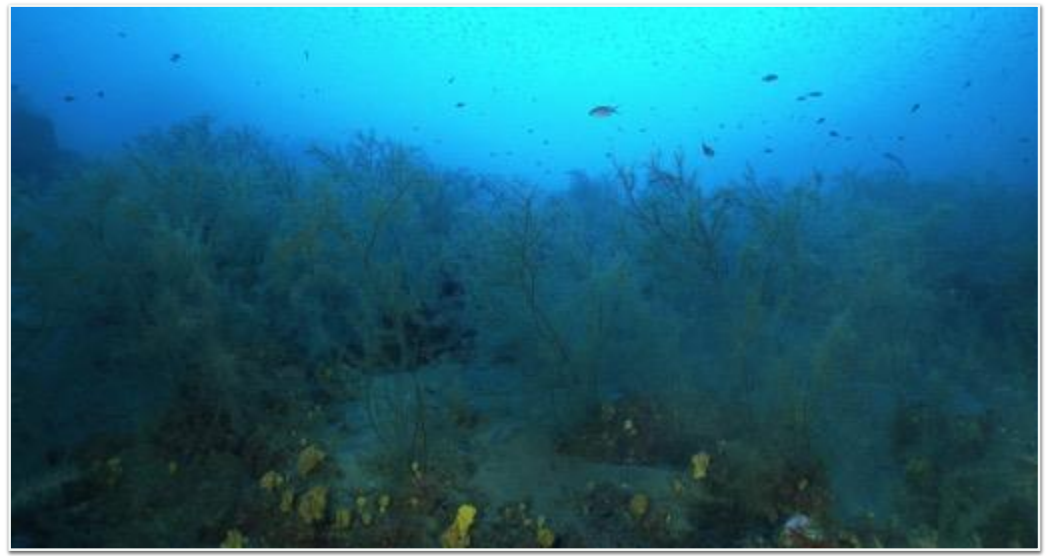
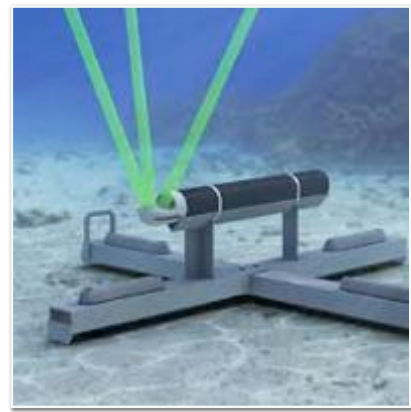
@Laurentballesta/Planète Méditerranée



© Andromède Océanologie

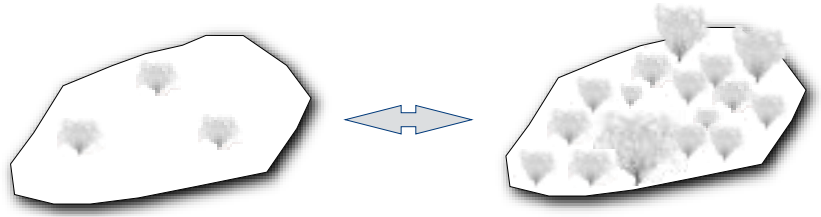


ACOUSTIC TECHNIQUES



✓ **MINIMUM CONSERVATION UNIT (MCU - COLONIES/M²)**

“The threshold of BCF (Habitat) structure (density) able to change current profile, and therefore keep their ecosystem functions and services delivered”

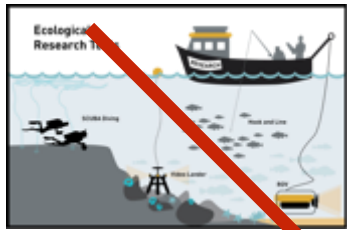


SPARSE COLONIES

BCFs

✓ MAPPING OF BCFs

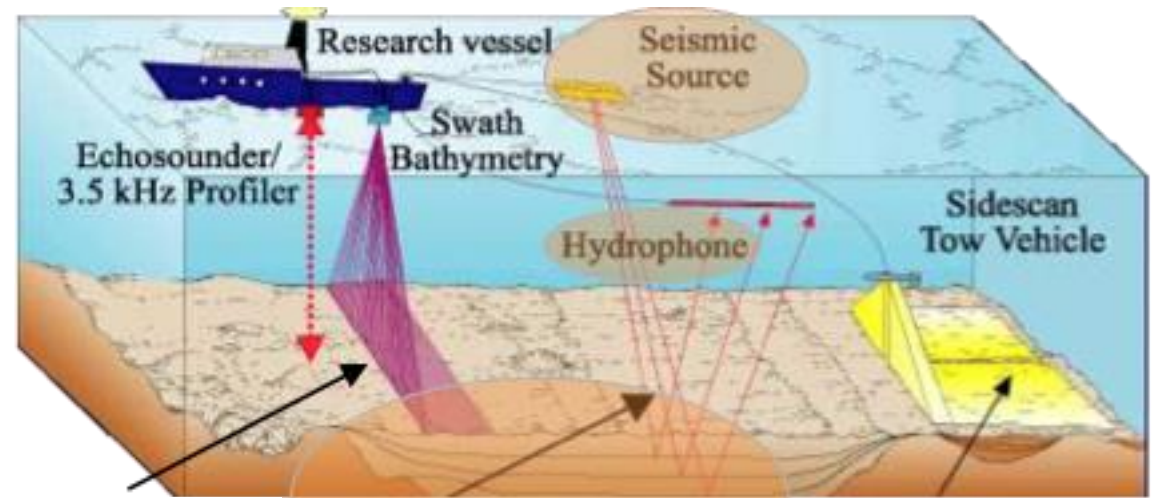
1. ON-SITE OBSERVATIONS



A. SATELLITE IMAGES



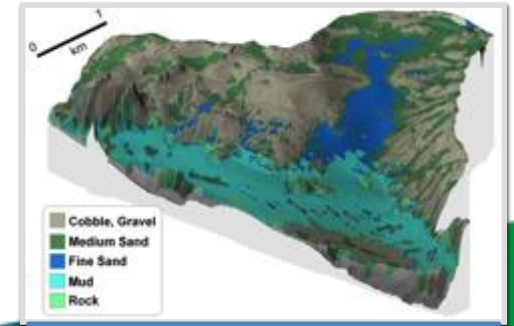
ACOUSTIC TECHNIQUES



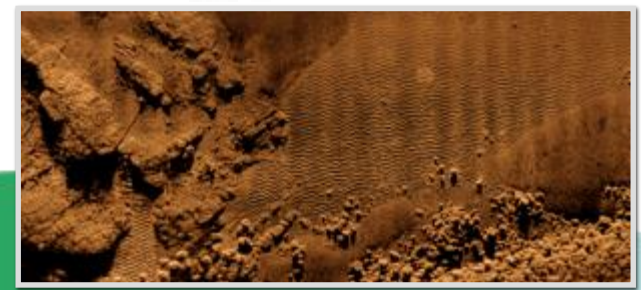
B. MULTIBEAM ECHOSOUNDER (MBES)

Seismic reflection (subsurface coverage)

C. SIDE SCAN SONAR (SSS)



Depth profiles, 3D images, terrain morphology



Seafloor Physical structure



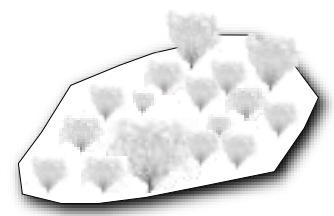
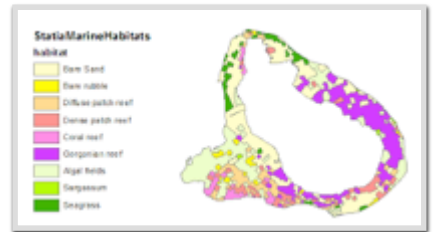
B-CHARMED OBJECTIVES:

Obj. 1: To fine tune acoustic methods able to map and characterize BCF
(Activity 1)

Obj. 2: To define the Black Coral Forest "Minimum Conservation Unit (MCU)"
(Activity 2)

Obj. 3: To characterize fish species inhabiting the BCF **(Activity 3)**

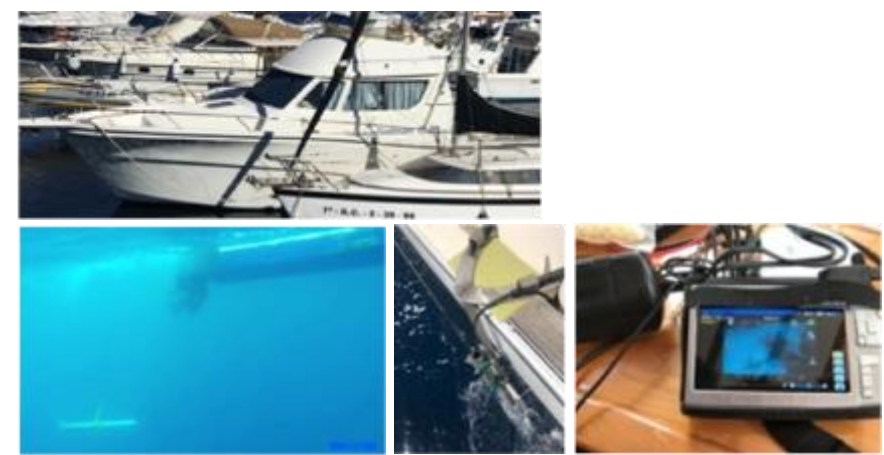
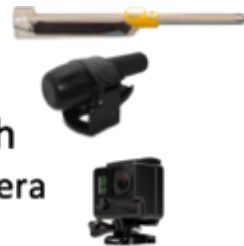
Obj. 4: To increase public awareness about the importance of BCF
(Activity 4)





ACTIVITY 1: ACOUSTIC CHARACTERISTICS OF BLACK CORALS FORESTS (2020-2021)

- Acoustic data
 - SSS
 - MBES
- Ground-truth
 - Video camera
- BCFs occurrence (25-100 m)



ACTIVITY 2: BLACK CORAL FOREST "MINIMUM CONSERVATION UNIT (MCU)" (2021)

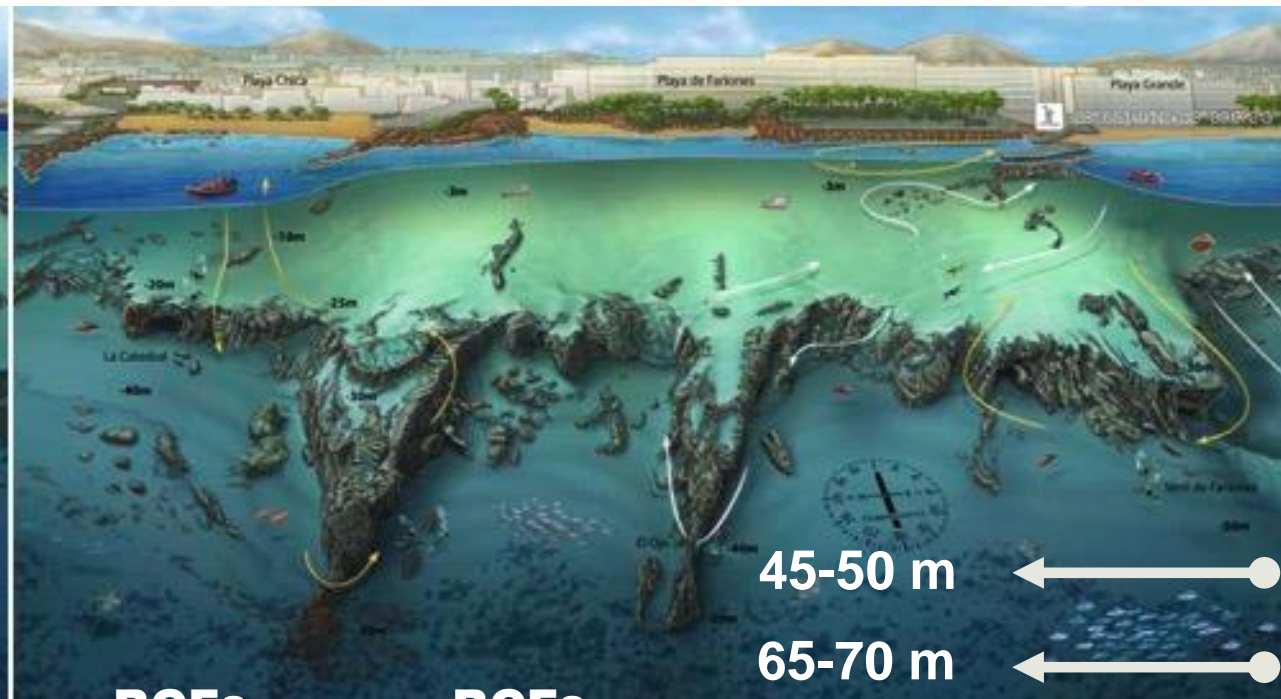
- ✓ HIGH RESOLUTION CURRENT PROFILES
- ✓ VARIOUS DEPTHS
- ✓ BCFs TRAITS: DENSITY AND HEIGHT
- ✓ ENVIRONMENTAL DATA: °C / SEDIMENTATION



BCFs

BCFs

BCFs



45-50 m ←

65-70 m ←

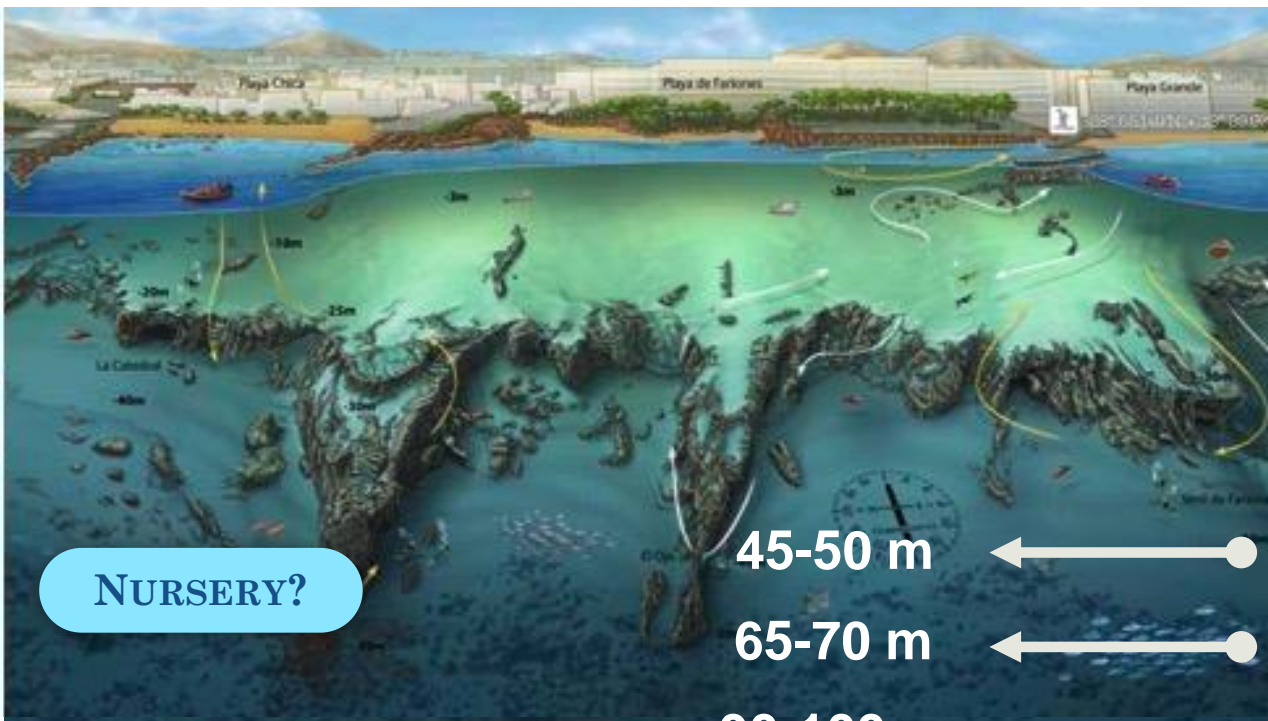
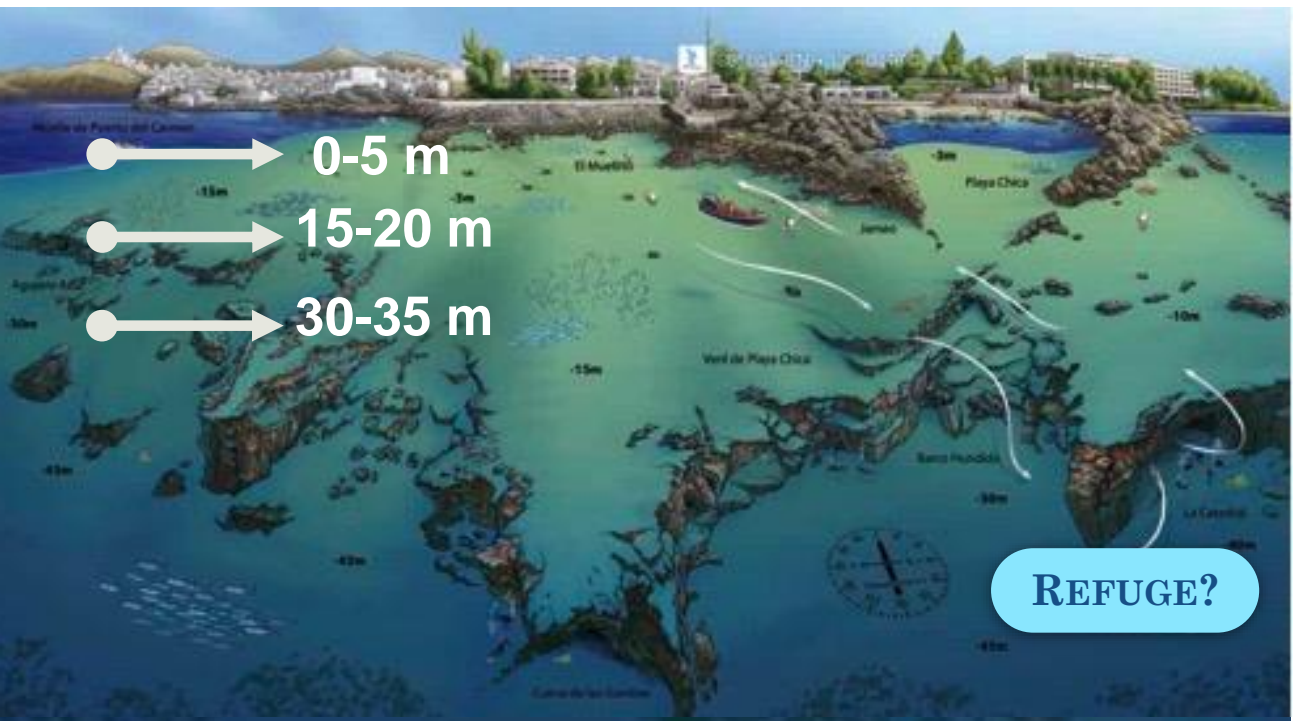
85-90 m ←

BCFs

BCFs

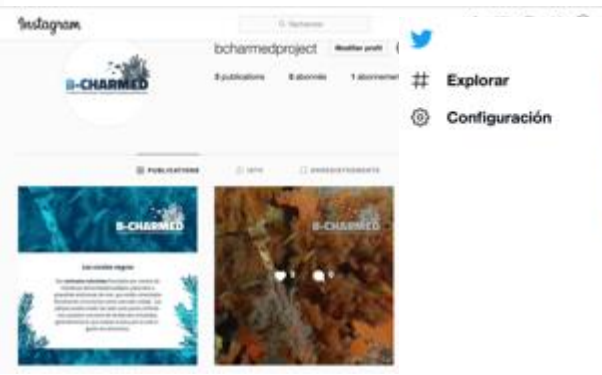
ACTIVITY 3: CHARACTERIZATION OF FISH COMMUNITIES INHABITING THE BCFs (2021)

- UNDERWATER VISUAL CENSUS
- ROCKY REEFS
- BATHYMETRICAL GRADIENT





ACTIVITY 4: PROJECT COMMUNICATION PLAN (2020-2021)



✓ 1-d Events



BEST

VOLUNTARY SCHEME
FOR BIODIVERSITY AND
ECOSYSTEM SERVICES
IN TERRITORIES OF
EUROPEAN OVERSEAS



VITAL SITES

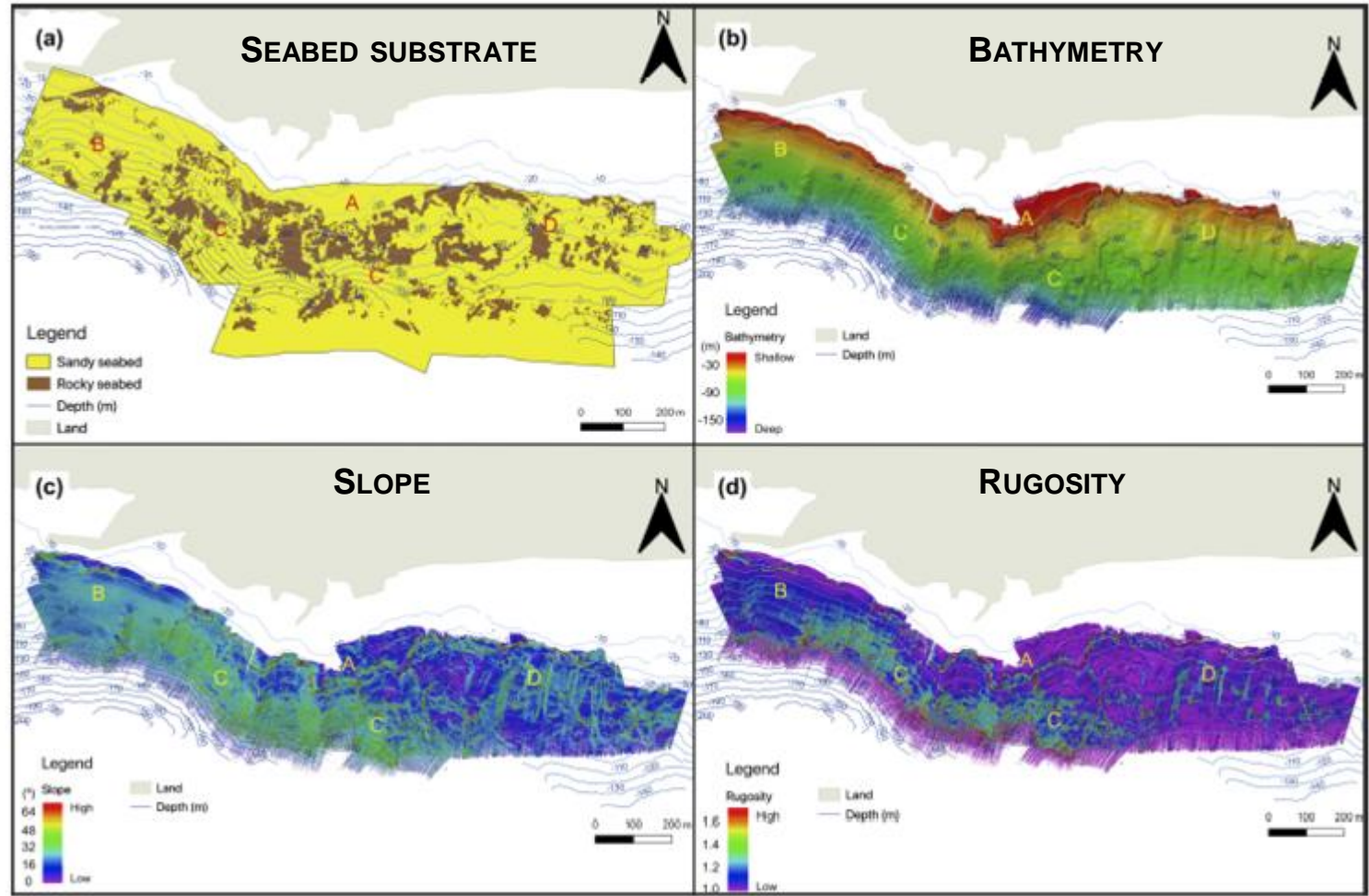
THE JOURNEY TO MARSEILLE

supported by



PRELIMINARY RESULTS

HABITAT CHARACTERISTICS OF BCFs

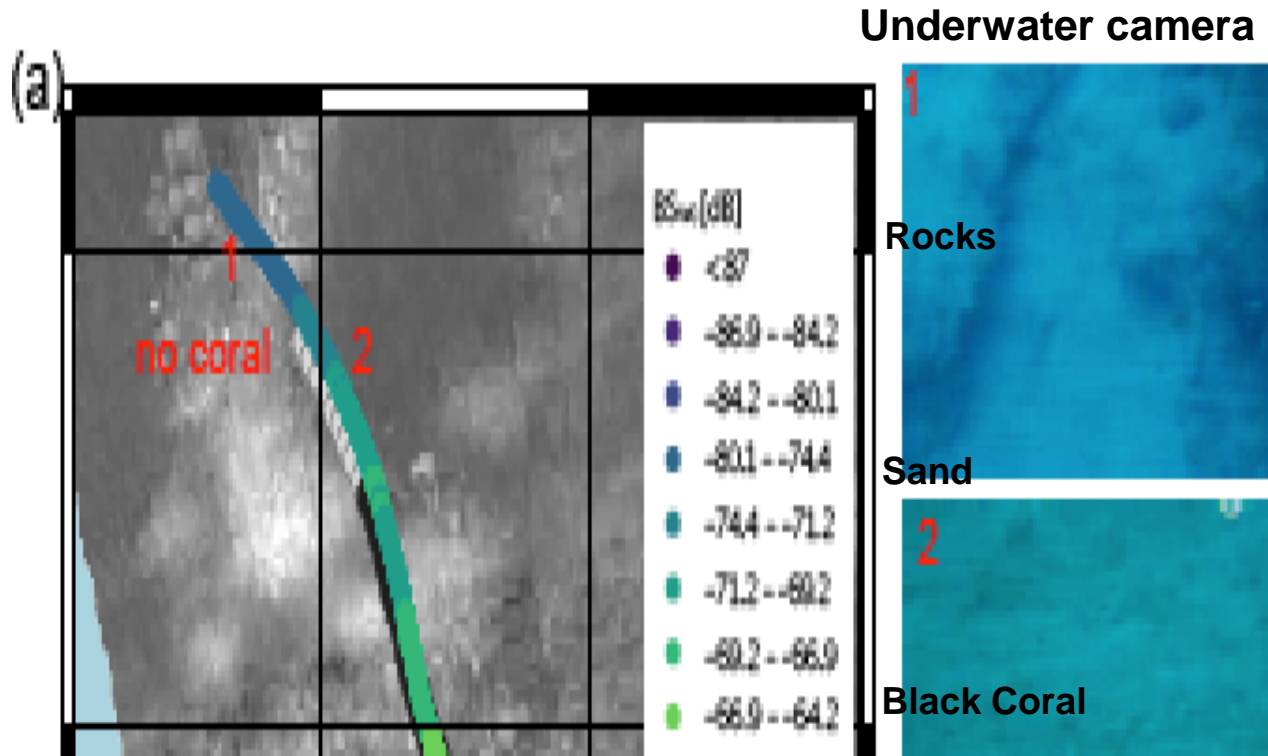


☑ BC density/height increase with depth and on steep and current facing slopes

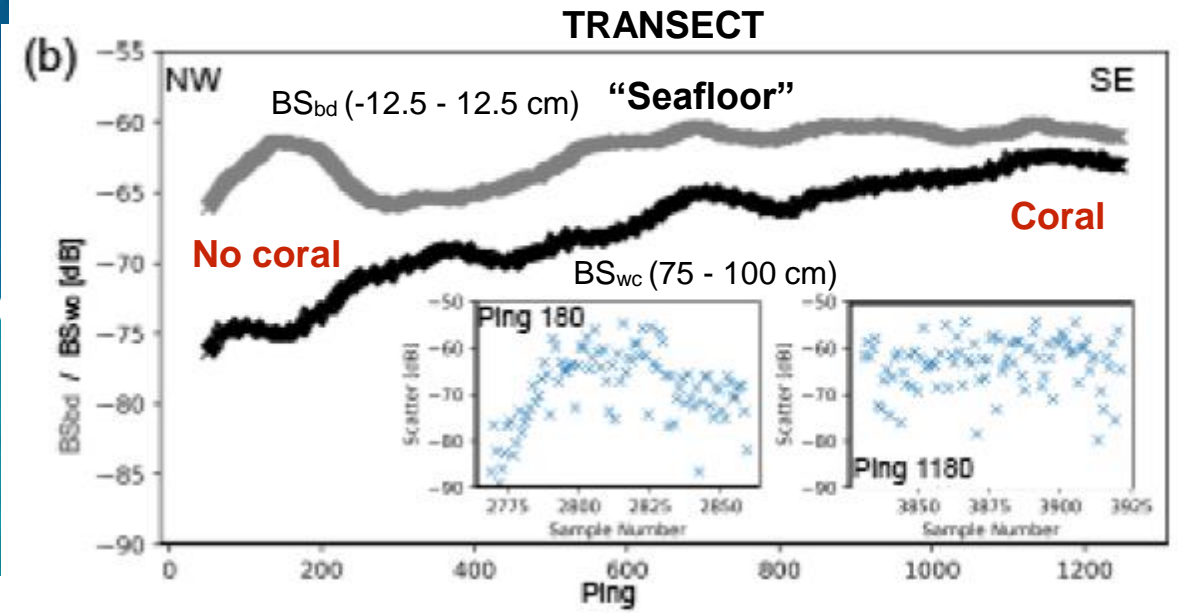
☑ BC presence not directly imaged on backscatter mosaics

A NEW HOPE...

☑ MBES water column scatter (75-100 cm)



Czechowska et al. 2020



2021 CAMPAIGNS...



Partners



Collaborators



THANK YOU

“Forests. For many of us, they are places of mystery and darkness. They are key to our climate and home to countless unique species. A future with more forests is key to the resilience of our planet.”

David Attenborough – “Our Planet”

<https://b-charmed.eu/en/>

More info on Vital Sites-Journey to Marseille Events:

<https://iucngreenlist.org/vital-sites-the-journey-to-marseille/>



More info on BEST:

<https://www.life4best.org/> / <http://www.best2plus.org/>



More info on PANORAMA:

<https://panorama.solutions/en>



BEST

VOLUNTARY SCHEME
FOR **B**IODIVERSITY AND
ECOSYSTEM **S**ERVICES
IN **T**ERRITORIES OF
EUROPEAN OVERSEAS



Thank you again!



VITAL SITES
THE JOURNEY TO MARSEILLE

presented by

