



NEWSLETTER 01

January 2021

EDITORIAL

Danovaro R. – AFRIMED Coordinator, UNIVPM

This is the first newsletter of the AFRIMED “Algal Forest Restoration in Mediterranean Sea” project. AFRIMED aims at making marine ecological restoration a simple and economic tool to promote biodiversity conservation, in order to increase the socio-economic benefits and develop innovative techniques to contrast local impacts impairing the success of the restoration of *Cystoseira* forests.

A special ambition of AFRIMED is to identify and implement the existing protocols for restoring degraded macroalgal forests in the Mediterranean Sea, with a specific focus on *Cystoseira* habitats.

Together with restoration interventions at several Mediterranean sites, AFRIMED will i) carry out multidisciplinary analyses of socio-economic costs, benefits and sustainability of restoration activities on a Mediterranean scale to evaluate the effects of restoration on ecosystem services, ii) aims at generating new job opportunities and create a new generation of environmental recovery experts, iii) promote the engagement of a wide community, comprising the industrial, scientific, public administrations, education and citizens sectors.

This allows us to identify strengths and weaknesses, to encourage the development of new technologies, to share information and promote effective and sustainable restoration activities throughout the Mediterranean Sea. Coupled with regulatory reform, this will help stimulate the private-sector and technological innovation in the marine restoration field, as well as to create new economic opportunities in the framework of the New green deal.

The new AFRIMED website (www.afrimed-project.eu) and the social networks of the project (e.g. Facebook, Twitter, YouTube) will continue to follow the scientific achievement of the project and will inform and involve the general public and stakeholders. Suggestions for additions, improvements and collaborations are welcome.



Prof. Roberto Danovaro AFRIMED Coordinator

Polytechnic University of Marche (UNIVPM), Italy

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AT MEETINGS

AFRIMED KICK OFF MEETING

Danovaro R., Bianchelli S. & Gerardin E.

The activities of the AFRIMED project officially started during the 1st meeting held in Rome, at the WWF Italy Headquarter on March 4-5, 2019 (Figure 1). All work-packages were presented into plenary sessions:

- WP1. Identification on damaged algal forest in Mediterranean basin
- WP2. Lab based development of *Cystoseira ssp.* restoration methodologies
- WP3. Field based refinement and restoration in Mediterranean basin
- WP4. Measuring the success of restoration action
- WP5. Developing a socio-economic partnership
- WP6. Communication and Dissemination activities
- WP7. Project Management

The meeting allowed an excellent discussion on the different tasks of the project, in particular the transfer of knowledge from the census of degraded habitats (WP1) and the pilot studies for macroalgal forest restoration (WPs 2-3) to the analysis of the effects of the marine restoration on the recovery of ecosystem services (WP4) and on the cost-benefit and socio-economic aspects (WP5). Special attention was dedicated to the importance to communicate and disseminate AFRIMED findings to stakeholders, including industry experts, non-experts and EU citizens (WP5 and 6).

During the meeting, the General Assembly met for the first time, as well as the Steering Committee. The three management bodies (Project Management Office, Steering Committee and Advisory Board) were officially established and presented.



Figure 1. Group picture of participants at the AFRIMED Kick-off Meeting in Rome.

AFRIMED FIRST ANNUAL MEETING

Danovaro R., Bianchelli S. & Gerardin E.

The First Annual Meeting project held in Marrakech, Morocco on 17-19 February 2020. A large audience including members of the Consortium, members of the project Advisory Board, invited speakers, stakeholders and the EU Project Officer participated to the meeting (Figure 2).



Figure 2. Group picture of participants at the First AFRIMED Annual Meeting in Marrakech

After the first year of intense work in the field and in the laboratory, goals and perspectives were discussed of the AFRIMED project. A series of interesting sessions, including workshops, progress meeting and Open Science talks were the core of this exciting meeting (Figure 3).

The AFRIMED meeting started with a word of welcome from our coordinator Roberto Danovaro, our hosts in Morocco and our Project Adviser.

During the meeting, the General Assembly met, as well as the Steering Committee and the Advisory Board.



Figure 3. Participants at the First AFRIMED Annual Meeting in Marrakech.

WP5 & WP6 INTERNAL MEETINGS

Papadopoulou N., Mangialajo L., Bianchelli S. & Marcellini F.

In the first half of 2020 we spent more time writing abstracts and preparing for events that eventually got cancelled. But, with a good mix of perseverance and enthusiasm we spent the latter part of the year making new plans and exploring opportunities for further liaising with stakeholders and raising awareness on marine restoration issues.



Figure 4. Pictures of the WP5 and WP6 team during the internal meeting.

SOCIETY AND BUSINESS

BOX 1. THE UN DECADES ON “ECOSYSTEM RESTORATION” AND “OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT”

Marcellini F.

The UN Decade on Ecosystem Restoration is a rallying call for the protection and revival of ecosystems all around the world, for the benefit of people and nature. It aims to halt the degradation of ecosystems and restore them to achieve global goals. Only with healthy ecosystems can we enhance people’s livelihoods, counteract climate change, and stop the collapse of biodiversity.

The ocean is our planet’s largest life-support system. It stabilizes climate, stores carbon, produces oxygen, nurtures biodiversity, directly supports human well-being through food, mineral, and energy resources; and provides cultural and recreational services. The ocean is rapidly changing, and yet the ways in which these changes will play out are not fully clear so far.

Global change is transforming the Mediterranean Sea more than other regional seas, exacerbating by the deleterious anthropogenic impacts. Direct and indirect human pressures on marine ecosystems are expected to further increase in the next few decades, leading to a serious loss of marine habitats, their biodiversity and to the impairment of ecosystem functioning. It is now widely recognized that restoration actions are needed to halt further decline.

Restoration was a key action of the Aichi Biodiversity Targets and in the UN Sustainable Development Goal 14 “conserve and sustainably use the oceans, seas and marine resources for sustainable development” in particular of target 14.2 “by 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration, to achieve healthy and productive oceans”.

The Decade dedicated by UN to “Ecosystem Restoration” and the UN Decade on “Ocean Science for Sustainable Development” that will both start in 2021 represent a unique combination and opportunity for the follow up of the AFRIMED results.

These global UN initiatives offer a great opportunity to restore marine ecosystems within European seas and will help and support the transition of our societies to a sustainable future. The experience and multitude of results that will be achieved in the framework of the AFRIMED project could represent an important contribution to maximize future initiatives of restoration in marine ecosystems also beyond European seas.

AFRIMED can thus provide a potentially huge contribution to the perspective of the European Green Deal, the European Commission's blueprint and roadmap to make Europe the first climate-neutral continent by 2050, with a sustainable economy that leaves no one behind.

SHARPER-THE EUROPEAN RESEARCH NIGHT 2019, ANCONA, ITALY

Marcellini F. & Bianchelli S.

The European Researchers' Night, held on 30 September 2019, was an event dedicated to popular science, fun learning and represented a unique opportunity to meet researchers, talk to them, and find out what they really do for society, in interactive and engaging ways. Ancona (Italy) was one of the 250 cities over Europe and neighbouring countries that host this particular event that contributes to communicating science to the general public. UNIVPM and ECOREACH presented the AFRIMED project to students and citizens present at the streets of the Ancona downtown (Figure 5). Poster, brochure and videos on the field works attracted the curiosity of the public on the topics of the marine restoration. We talked about the sea, active citizenship and sustainable development (without forgetting games, direct observation under the microscope, educational tools and much more). Do you love the sea? Find it out with a researcher!



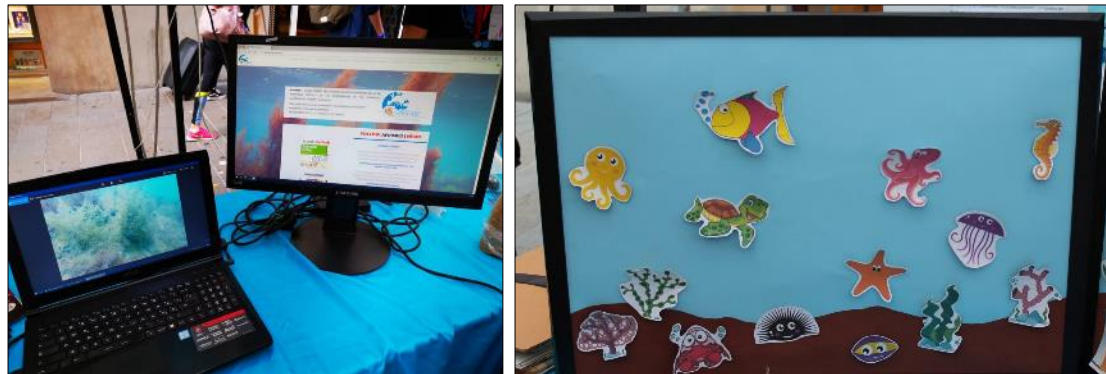


Figure 5. The European Researchers' Night in Ancona, Italy.

YOUR FUTURE FESTIVAL #YFF2019

Marcellini F. & Bianchelli S.

The sixth edition of Your Future Festival was held in Ancona (Italy) 13-18 May 2019 at the Polytechnic University of Marche.

“Anticipate the future and imagine it”. This is the theme of this edition of Your Future Festival "the future to imagine".

Students are the primary engine of our society and for them, the Polytechnic University of Marche strongly wants to build serious opportunities for their future through a concrete enhancement of knowledge. YFF was created with the aim of opening up to the cities in which the Polytechnic University of Marche operates and fostering connections between Faculties, students, researchers, the territory and social and economic systems. The event, which is divided into workshops, discussions, reports and moments of entertainment, acts as a ‘cocktail-shaker’ between all the subjects with which the Polytechnic University of Marche interacts.

In fact, the university has the task of anticipating the future, it cannot give its students only the vision of the present but must give them the tools and knowledge to face the future in which they will live to contribute to economic, social and cultural growth, to cancel any social inequality.

In this context, the AFRIMED project was presented to the students, bringing them closer to the delicate theme of sustainable development, protection and restoration opportunities in the marine environment (Figure 6).



Figure 6. AFRIMED Project Coordinator Roberto Danovaro with students of elementary and middle schools of the area during the YFF2019.

AFRIMED QUESTIONNAIRE: SOCIETY AND BUSINESS (WP5)

Papadopoulou N. & Mangialajo L.

Science and policy call for marine restoration. But what interests and motivates stakeholders for the implementation of algal forest restoration? With this question in mind, a questionnaire was produced by WP5 addressed to all private and public sectors interested in the conservation and restoration of the coastal marine environment.

Marine ecosystems are used by many marine activities which cause a number of pressures. In recognition of this, various international and EU policies call for the protection of at least a part of marine ecosystems e.g. to protect 10% of the seas by developing networks of Marine Protected Areas or to restore 15% of damaged ecosystems to assist their recovery.

The aim of this survey is to record the expectations of stakeholders from the public and private sectors who share an interest in coastal ecosystem conservation and restoration (e.g. decision-makers, MPA managers, scientists and consulting offices, and users of ecosystem services).

Your views are very important to our research! Make your voice heard. You will find the questionnaire on the AFRIMED project website (www.afrimed-project.eu).

The questionnaire is anonymous; no names or e-mails are required and the answers cannot be linked to the participants of the survey.

Many thanks for your support and time!



Figure 9. AFRIMED questionnaire (www.afrimed-project.eu)

TRAINING COURSE IN MARINE RESTORATION OF THE MEDITERRANEAN

Marcellini F., Bianchelli S., Frascchetti S. & Danovaro R.

The First Training Course in Marine Restoration of the Mediterranean, a joint MERCES and AFRIMED project event, took place the first week of September 2019 in beautiful Tricase Porto (Apulia region, Italy). Our staff and a dozen participants from Italy, the UK and Turkey were kindly hosted in the facilities of AvampostoMare, CIHEAMBari and Porto Museo di Tricase.

This summer school was dedicated to the university students (e.g. PhD students, master's degree, bachelor's degree).

The first day has focused on building the context in which the course will unfold. AFRIMED coordinator Roberto Danovaro introduced the concepts of restoration, BlueGrowth and sustainable development - stressing how global challenges need global responses, stemming from basic science and all the way up to applied research and socio-economic implications. Jean-Baptiste Ledoux provided an in-depth analysis of themes linked to population genetics and restoration, on the backdrop of ecosystem functioning and changing scenarios. Carlo Cerrano closed the day talking about ecosystem engineers and their key role for marine restoration.

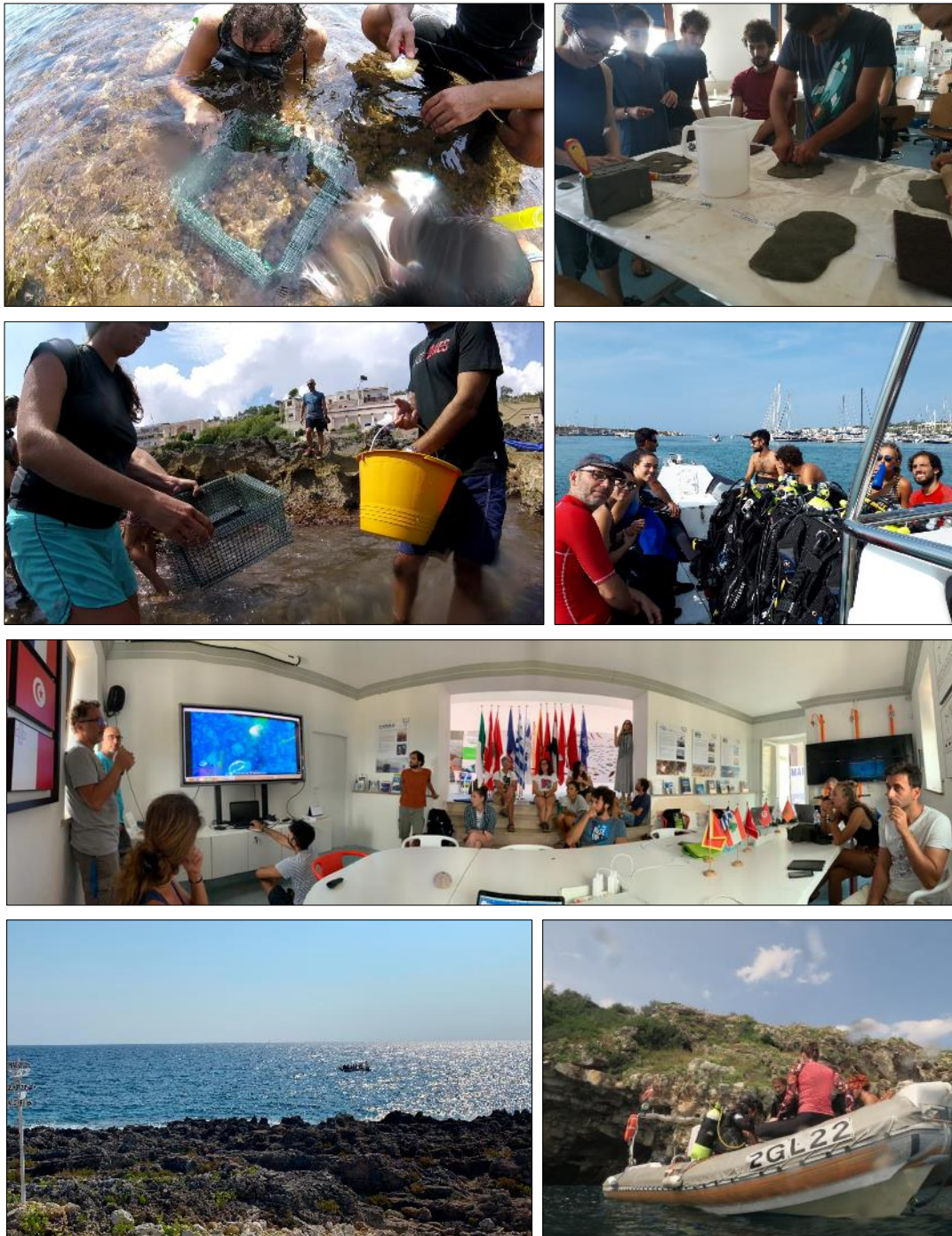


Figure 7. The First Training Course in Marine Restoration of the Mediterranean, a joint action by MERCES and AFRIMED projects in Tricase Porto (Apulia, Italy).

PLANTING THE SEEDS FOR THE NEXT GENERATION OF ECOSYSTEM RESTORERS: AFRIMED PRESENTED TO THE STUDENTS

Marcellini F. & Bianchelli S.

In May 2019, January and February 2020, ECOREACH and UNIVPM jointly organized training sessions with middle- and high-school students on the topical subject of restoration of marine ecosystems.

A seminar was held to explain the importance of marine ecosystem restoration to students and the AFRIMED project was presented.

An entire day was dedicated to field and in the laboratory activities.

Many activities have been carried out in order to make students understand the hard work behind the recovery of the marine environment and the enormous importance of protecting and safeguarding our ecosystems.

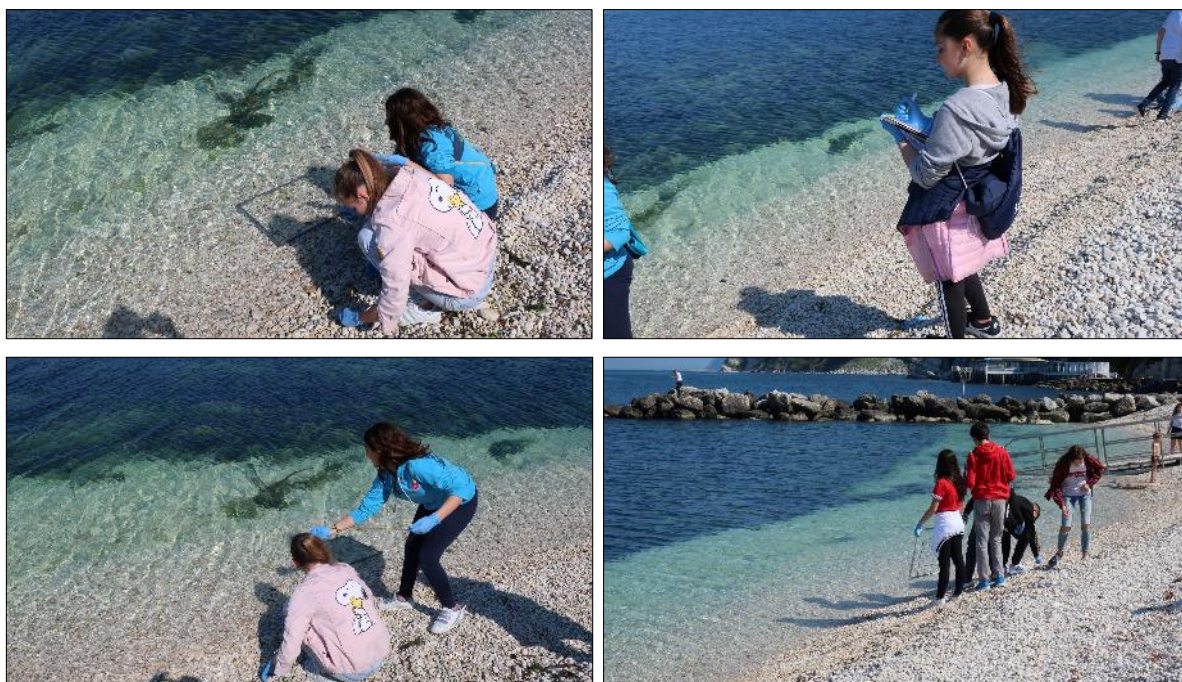




Figure 8. Pictures of the training with the high and middle school students.

AFRIMED DURING THE COVID-19 PANDEMIC

BOX 2. COVID-19: THE GLOBAL HEALTH CHALLENGE OF 21ST CENTURY.

Marcellini F.

On 31 December 2019, the Chinese health authorities announced an outbreak of pneumonia cases of unknown aetiology in the city of Wuhan (Hubei Province, China).

Geneva, 11 February 2019, the World Health Organization (WHO) and the Coronavirus Study Group (CSG) of the International Committee on Taxonomy of Viruses have officially classified under the name of SARS- CoV-2 the virus provisionally named by the international health authorities 2019-nCoV and responsible of the COVID-19 (Corona Virus Disease), formally associating it with the coronavirus that causes severe acute respiratory syndrome (SARS-CoVs, Severe Acute Respiratory Syndrome CoronaViruses) (SARS-CoV-2).

Geneva, 11 March 2020, the WHO declares the status of a global pandemic from Covid-19. The epidemic has spread around the world.

The World of the Research has mobilized in a race against time to study Covid-19, the mechanisms of spread and contagion but in particular a vaccine to war it.

The COVID-19 pandemic has become the global health challenge of the twenty-first century, with enormous impacts on most aspects of human activity, as well as on the economy and health systems.

In this vulnerable setting worthy of film director George A. Romero, as human action retreated and our lives changed, the environment around us changed too.

The slowdown in daily life has shown us how nature can take back its spaces and breathe a sigh of relief. And very fastly. The directives of social distancing and the imposed quarantine have in fact led to a substantial reduction in travel, consumption of fossil fuels and production which has resulted in lower emissions of smoke and waste due to the consumption of oil, going to reduce pollution atmospheric (Muhammad et al., 2020).

For example, the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) recently reported that nitrogen dioxide air pollution has been significantly reduced in connection with the community quarantine and lockdown in many world countries has improved and No₂ emissions reduced by about 30% (Muhammad et al., 2020, Figure 10) and the CO₂ emissions were down 25% in the two weeks following the

Chinese New Year holiday (Myllyvirta 2020). Air pollution affects climate and may induce drastic changes on ecosystems, which can also exacerbate infectious diseases outbreaks by affecting pathogens, hosts, vectors, and transmission dynamics (El Zowalaty et al., 2020; Howard et al., 2019)

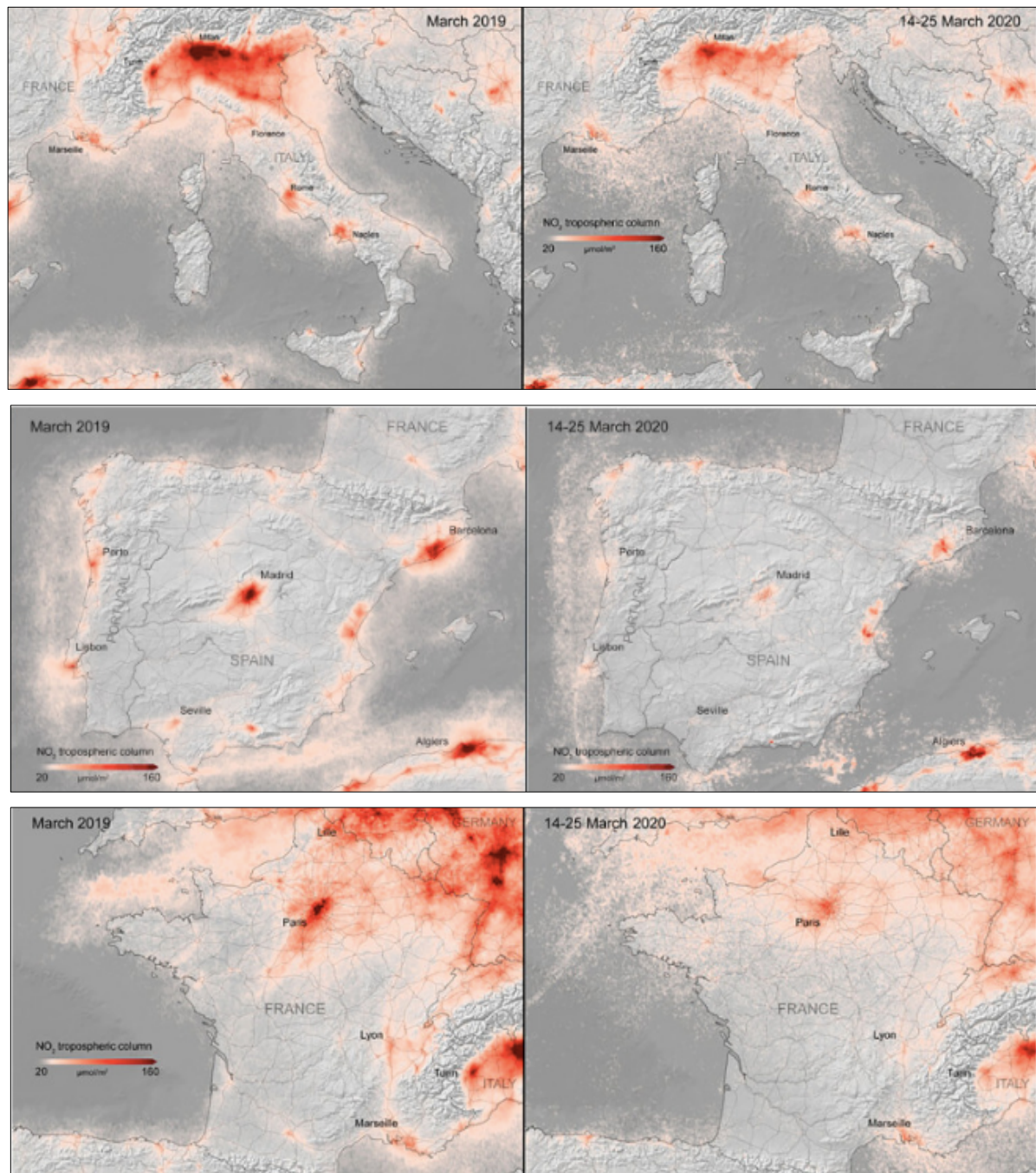


Figure 10. NO₂ emissions in different European countries before and after lockdown. (ESA 2020; NASA 2020).

These positive effects on the environment are probably mostly temporary, but they can serve to make us reflect, for example, on the fact that changes in our way of life can have positive effects on the environment. After this pandemic, we will have to ask ourselves many questions about which behavioural changes are good for the climate and respect for our environment. The coronavirus pandemic shows us how fragile our environment is but also how integral it is to human and animal health. It is necessary to build a system capable of managing the global crisis and learning to act with greater awareness. Doing nothing means that the impact of climate change on our lives will be even more violent and the responsibility will not lie with a few, but with all of us.

In this context, it becomes urgent to initiate an economic and social transformation in favour of the environment and sustainable development.

For these reasons, the AFRIMED project did not stop, despite the fragile global context, and the field and laboratory activities continued, despite the difficulties encountered.

A Good job!

AFRIMED DURING THE COVID-19 PANDEMIC

Papadopoulou N., Mangialajo L. & Hannachi A.

Departing from Marrakesh, February 2020, after our 1st AFRIMED Annual meeting, our minds and calendars were full of beautiful ideas to develop further, contacts to pursue, conferences and events to attend (especially SER and EMD/EASME symposia), lab experiments to do and many restoration field actions to perform in 6 countries at multiple restoration sites. We were focused on the health of our donor populations in the field and of our lab specimens. But the COVID pandemic has put a completely different and sharp focus on health; this time on our own health and the way we interact with nature and everything else we had taken for granted. As Amel from Tunisia says 'at the beginning of the COVID crisis we were able to do some work, respecting the new health and safety protocols given by the national government and visit our sampling sites under government authorization'.

But then suddenly ... we were all in lockdown; Ina from Albania, Amel from Tunisia and Brahim from Morocco had to see all their lab and fieldwork stopped while also facing new challenges in purchases of equipment for laboratory set-ups. Emma from Spain had to cancel the much anticipated AFRIMED summer training course 'Restoration of *Cystoseira* forest: a practical perspective' originally planned for April in beautiful Menorca (with 23 participants from 6 countries) and many of their field activities. Simonetta and Silvia and

their teams in Italy were also unable to reach their sites for months (due to early strict lockdowns) but managed to restart AFRIMED field work in May implementing new safety protocols. Around the same time, Sotiris in Greece, Luisa in France, and teams in Italy and Spain also started their phenological monitoring while planning lab experiments to study thermal and pollution thresholds of several *Cystoseira* species.

Teams in France had to face beach closures in their known sites and, taking the challenge head on, they explored new areas where they found species that were supposed to be lost. As most *Cystoseira* species reproduce in March-May, they were really worried about getting fertile receptacles on time. Luckily one of the two targeted species was still in reproduction and they were able to perform two small pilot experiments on the factors that may affect *Cystoseira* restoration, one in the field and one in the laboratory.

Valuable lessons were learnt through this experience. Science and scientists can carry on with enthusiasm and positivity, taking advantage of what we have, and thinking of short-term out-of-the-box solutions, while being hopeful and thankful for the AFRIMED project extension that gives us all an opportunity to fulfill our restorative potential. Thanks to the COVID lockdown we realised how precious is every little freedom we have and, in the words of *Ursula von der Leyen, President of the European Commission*, how important is '*bringing nature back to our lives*'. Restoring nature is at the forefront of the new EU Biodiversity Strategy 2030 and AFRIMED is part of this renewed ambitious commitment to restoration.

Recent research shows that contact with nature and blue and green spaces has helped people cope better with lockdown restrictions. As these continue, we share photos of our activities and our optimism for the future. And being part of '*making nature healthy again*' for the benefit of people, climate and the planet.





Figure 13. Pictures of the AFRIMED partner from the France (Université Côte d'Azur), Italy (Polytechnic University of Marche) and Tunisia (University of Chartage).

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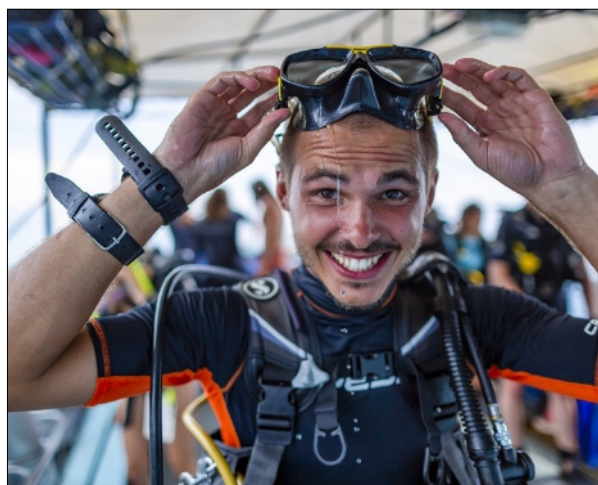
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INTERVIEWS WITH YOUNG AFRIMED RESEARCHERS

FRANCESCO MARTINI: Research fellow at the Polytechnic University of Marche

Hi Francesco, tell us something about yourself and your studies.

I'm Francesco Martini, I'm 27 years old and I'm from Treviso, Italy. Since I was young, I had the passion for nature and in particular for the sea, spending a huge amount of hours with the head under the sea looking for cool animals and studying their behavior. Because of this I decided to study Science and Technology for the Environment and Nature at Trieste and then Marine Biology at the UNIVPM. During the last year of my studies, I did the dissertation on "The brown alga *Cystoseira barbata* on the Conero



Riviera: phenology, recruitment and associate macroalgal community". In this study, I monitored 20 different individuals of *Gongolaria ssp.* for one year. Firstly, I studied their seasonal life cycle through field sampling by snorkeling. Secondly, their fertility through microscopic analysis in the laboratory. Lastly, I identified the macroalgal community that lives associated with *Gongolaria ssp* through photographic sampling and laboratory observation.

During my final year at university, I had the opportunity to win the Campusworld scholarship, which allowed me to spend six months in Thailand. There, I could become a divemaster and a conservation diver trainer, as well as doing an internship at New Heaven Reef Conservation Center

What are you working on now?

After travelling around Tasmania for four months, the Covid-19 brought me back to Italy where I applied for the position of researcher for the AFRIMED project at the Marche Polytechnic University. Based on my previous experience, knowledge and my findings on *Gongolaria ssp.* I won the job contract and I've started working full time in the AFRIMED project since January 2021.

The aim of this project is to study the success of restoration interventions of macroalgae forests, with an ecological approach, and to evaluate their effects on ecosystem services and associated biodiversity along the Marche coasts.



Within the AFRIMED project I have different tasks that range from theoretical to more practical on-the-field activities. As this project started already 2 years ago, first of all I had to take the results found until today and analyzed the positive and negative aspects of the

experiments done last year in order to improve the negative ones. Especially at the beginning, I actively participated to bring new techniques to try this year for having a better result compared to the previous experiments. Moreover, I actively participate in the monthly samplings, even during the adverse season, monitoring the experiments that were successful last year and in addition those that will be carried out this year.

I'm very happy to be back in this field after my experiences around the world and I'm very happy to be part of this amazing group.

MARGALIDA MONSERRAT: PhD student at Université Nice Sophia Antipolis (UNS)

Hi Margalida, tell us something about yourself and your studies

My name is Margalida Monserrat, I am from Balearic Island and I grew up in a very close relationship with the sea. I have always been very curious about sea creatures and I am convinced that we have to protect them from human impacts. I studied Marine Sciences at the University of Alicante, and I did my master's degree at the University of Las Palmas de Gran Canaria where I discovered the importance of marine restoration.

Currently I am doing a PhD in the context of ecological restoration, on the ecology of marine forests (*Cystoseira sensu lato*) and in particular assessing if the loss of marine forests could potentially increase the risk of benthic harmful algal blooms (HABs) (*Ostreopsis spp.*). A large part of my PhD is carried out in the framework of AFRIMED project, under the supervision of Luisa Mangialajo (Ecoseas, Université Côte d'Azur), with Steeve Comeau (LOV, Sorbonne Université) and Mariachiara Chiantore (University of Genova) as co-directors. My PhD is funded by the Région



Provence-Alpes-Côte d'Azur and the research is performed in partnership with the Antibes Municipality and the Nice Côte d'Azur Metropole mostly in the Natura2000 sites "Cap Ferrat" and "Baie et Cap d'Antibes – Iles de Lérins".

What are you working on now?

Marine forests regression is a worldwide phenomenon that is particularly evident in the Mediterranean Sea, where *Cystoseira sensu lato* species constitute one of the most productive and diversified ecosystems. The consequent loss of ecosystem functions and services, the unlikeliness of natural recovery and the potential increased risk of emergent phenomena (such as benthic HABs) highlight the need of restoration actions. It is therefore essential considering the mechanisms that could compromise the outcome of these future restoration actions.



Due to Covid-19 this year we were not able to set up the experiments concerning *Ostreopsis* blooms. Nevertheless, we have been working on different research experiences, in the lab and in the field, to assess the effects of ocean warming and herbivory on the recruitment of early life stages of *Cystoseira compressa* and evaluate the potential of restoring this species under ongoing global change. We studied the effect of temperature on *C. compressa* in vitro recruits in laboratory-controlled conditions and, simultaneously, the herbivory pressure during an exclusion experiment in the field. Our preliminary results seem to show that high temperatures and herbivores negatively affect the density of recruits and that those factors have to be taken into account in restoration actions.



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