MaCoBioS

WP2 - EXPERT ENGAGEMENT WORKSHOP

Design of the expert-based multi-risk assessment framework - MRAF underpinning cumulative impact appraisal in marine and coastal ecosystems (MCEs)

WP2 - T2.1 Risk and adaptation of marine coastal socio-ecological systems

24th March, 2021 - Virtual Workshop

INTRODUCTION

Multiple activities are taking place across marine and coastal ecosystems (MCEs) without the full understanding of the composite interactions between natural and human-induced changes. The cumulative and synergistic impacts among these activities and climate change are triggering complex and severe alterations of MCEs biodiversity and their capacity to supply services for human well-being.

Drawing on this issue, **Work Package 2 aims at reinforcing the ecosystem risk concept to efficiently implement ecosystem-based assessment and management measures** allowing to better face multiple risks arising from the dynamic interplay between climate change and human-induced pressures. To achieve this bold objective, as a first step we need to better frame and disentangle these complex interrelationships under a multidisciplinary and sound framework, embracing all MaCoBioS analytical perspectives and scientific knowledge.

This is why, we need the expertise, knowledge, and engagement of all MaCoBioS Experts!

OBJECTIVES AND EXPECTED OUTCOMES OF THE WORKSHOP

CO-DESIGN A MULTI-RISK ASSESSMENT FRAMEWORK (MRAF) UNVEILING THE COMPLEX INTERPLAY BETWEEN NATURAL AND ANTHROPOGENIC PRESSURES AFFECTING MCEs AND THEIR SERVICES.

This bold objective breaks down in more specific ones, including the:

- Identification of **human-made and climate-related pressures** affecting MCEs, together with their potential synergies.
- **Characterization of the vulnerability of MCEs** to the identified pressures (both in terms of sensitivity and adaptive capacity).
- **Integration of the ecosystem services concepts** into the multi-risk assessment framework.

HOW DOES THE WORKSHOP WORK?

PRE-EVENT PHASE

Last week we shared with you a **questionnaire in Ahaslides,** that allowed us to get **preliminary information** and your perspective on key components underpinning the MRAF (e.g., pressures, exposed targets, vulnerability of MCEs, etc...). This first-pass knowledge allowed us to set up the forthcoming thematic World Cafè discussions and feed the initial set-up of the MRAF, as already planned for the workshop.

DURING THE EVENT

The workshop is composed by **three main activities,** as detailed in the following pages:

1) World Cafè Discussion
2) Co-design the MRAF
3) Wrap up all together

POST EVENT PHASE

The results of the workshop will be used to **fill in the Milestone M10** on the 'General conceptual framework for multi-risk appraisal'.
Moreover, we will customize the overall results in a poster that we will share with all participants.

1 WORLD CAFE' DISCUSSION (45 MIN)

It is a method designed to create a safe, welcoming environment to intentionally connect multiple ideas and perspectives on a specific and complex topic, by engaging participants in several rounds of small-group conversation.

1

Workshop's participants are divided into **three Zoom rooms,** where two moderators, with a different background, and a supporting team will drive the group's discussion.

2

Each couple of moderators will focus the discussion on different topics: **pressures affecting MCEs, vulnerabilities of MCEs, and ecosystem services, etc.** (depending on the preliminary information get from the Ahaslides questionnaire shared in the pre-event phase).

3

Every **15 minutes** moderators and supporting teams will change the Zoom room (and accordingly their audience) keeping their own topics. While participants will stay in their room and will therefore have the possibility to contribute to all topics.

4

Round by round, the discussion will start from the outputs of the previous group, thus also allowing to further increasing the complexity of the discussion together with its results.

2 CO-DESIGN THE MRAF (1 HOUR)

The core of the workshop will be in this exercise, in which different inputs, from the previous discussions during the World Café section, will converge into a systemic framework.

1

Building from the outputs of the World Café discussion and always remaining in the three Zoom rooms, participants will be involved in the **co-design of the framework** using the interactive **Miro dashboard**.

2

The focus will be on **physical, chemical and biological-related risks** and their **interactions and interconnections** with the exposed targets and vulnerability patterns.

3

Moderators and supporting team will drive this exercise in order to feed the framework with the previously collected information (Ahaslides questionnaire and World Cafè) as well as key insights and knowledge provided by the involved participants.

3 WRAP UP ALL TOGETHER (30 MIN)

Within a plenary session, we will try to merge together the three different frameworks in a unique MRAF, highlighting the interconnections among factors at stake.

1

The last activity will focus on merging together the MRAF built in the three different Zoom rooms, thus converging in a **unique MRAF** through a **plenary discussion session**.

2

Moderators will highlight the key points (differences and similarities) emerged in the three parallel MRAF co-design/rooms.

WORKSHOP DICTIONARY

WHAT DO WE MEAN BY 'FRAMEWORK'?

Over the last decades, numerous and diverse issues leading to ecological implications have challenged both environmental scientists and decision-makers in the understanding of the relationships between social/economic interests and the associated environmental problematic issues, requiring practical evaluation techniques building on interdisciplinary approaches. Risk assessment is a rather complex procedure that can help to analyze and manage a wide range of environmental issues, including those related to climate change. Different risk assessment methodologies have been developed in order to understand processes underpinning MCEs deterioration. Most of these methods apply a **stepwise** (and cyclic) **approach**, starting from the **definition of the problem**, toward the **risk identification, analysis, and evaluation**. Particularly, the definition of the issue of concern, including the **identification of all relevant threats** (sources of risk), the potential **exposure pathways,** and the **harm** (losses) that might result from exposure to hazard (impacts), is the first step for an effective risk assessment.

A clear definition of the issue at stake can assist in selecting the level and types of methodology to be used in the following steps of the assessment. The development of a **conceptual framework** may help to formalize the issue at hand, showing, in a systematic way, the **relationships between the natural and anthropogenic sources of risk, the exposed coastal and marine targets** (e.g., seagrasses meadows, mangroves, coral beds) **together with their vulnerability factors and the resulting environmental, physical, biological and socio-economic impacts.** Moreover, conceptual frameworks provide a **schematic representation** of the limits of the analyzed system and may help to **identify all data sources** (physical, environmental and socio-economic information) needed to understand and evaluate the multidisciplinary nature of risk.

Within WP2, the **MRAF** will be useful to **better understand and disentangle multi-risk dynamics underpinning MCEs response to multiple pressures** (including climate change), while **identifying key indicators and data to be collected** for its operationalization across the MaCoBioS eco-regions.

WORKSHOP DICTIONARY

SHARED TERMINOLOGY

The definition of risk and its measurement is still an open issue for discussion in the scientific literature. Many disciplines dealing with risk assessment have different views about its definition and the components that have to be included in the process of its calculation.
Preliminary analysis conducted by the WP2 team highlighted a series of evidences that were kept in the background during all the activities underpinning the preparation of this workshop, including:

- Substantial **discrepancies in the risk and cumulative impact-related literature**, fragmented into many disciplinary streams, with different definitions evolving within each community.
- At least **two distinct conceptual frameworks of greatest interest** for our work: the **DPSIR** (Driver-Pressures-State-Impact-Response) and **risk-based** (as result of the interaction among hazard-exposure-vulnerability) frameworks, with related terminologies reported in the Table below.

Terminology	Description	Examples and/or unit of measurement	References
(Full name of terminology)	*(Short description of the terminology)*	*(Provide at least an example of this terminology)*	*(Provide the reference where you quote the terminology)*
DPSIR framework			
Drivers/driving forces	They represent natural and anthropogenic forces which can drive variations in the state of socio-ecological systems(s). Drivers/driving forces, in turn, may exert intentionally or unintentionally 'pressures'.	E.g., Population growth and migration; change in economic activity/socio-economic development; solar irradiance;	Neves et al., 2008
Pressure	Pressures can broadly be described as the means through which drivers are actually expressed i.e., the way they may interfere, perturb and alter socio-ecological systems(s), then causing an effect (or multiple ones) on any of its/their part.	Port activities, Extraction of biomass, seabed abrasion, tourism, shipping traffic; changes in temperature and sea level, ...	Oesterwind et al., 2016; Neves et al., 2008)
State/state change	The state is the actual condition of a system(s) and its components, established in a certain area and under a specific time frame. It can be quantitatively-qualitatively described based on physical (e.g., temperature, light), biological (e.g., genetic-, species-, community-, habitat-levels), and chemical (e.g., nitrogen level, atmospheric gas concentration) characteristics.	Water quality, vegetation, biomass, size distribution of fish, benthic biodiversity	Oesterwind et al., 2016

WORKSHOP DICTIONARY

Impact	Consequences of system(s) state change in terms of substantial environmental and/or socio-economic effects which can be both, positive or negative.	Loss of habitats/species health, loss of resilience, chances in local communities, loss of water quality	Oesterwind et al., 2016
Responses	Responses are the reactions by the society and policy makers triggered by the impacts, and may target drivers, pressures, state/state changes or impacts.	EU regulation	Maxim, 2009
RISK-based framework			
Hazard	The potential **occurrence of a natural or human-induced physical or chemical events or trends that may cause loss of life, injury, or other health impacts, as well as damage and loss** to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.	Input of hazardous chronic and acute chemical substances; Input of impulsive anthropogenic sound; Biological hazard with the introduction of non-indigenous species and translocations; Physical disturbance or damage to seabed (temporary or reversible effects)	IPCC, 2018
Exposure	The **presence of people, livelihoods, ecosystem and their services, infrastructure, or economic, social or cultural assets located in places that could be adversely affected** by **natural or human-induced hazards**.	Presence of marine habitats (e.g., seagrass, salt marsh, mangrove, maerl, kelp, coral); Fish; Marine mammals; Reptiles; …	Adapted from IPCC, 2018
Vulnerability	It represents the **propensity or predisposition of a community, system, or asset to be adversely affected by a certain hazard**. In a broad sense it should include economic, social, geographic, demographic, cultural, institutional, governance and environmental factors. Vulnerability encompasses a variety of concepts and elements including **exposure to external impacts, sensitivity** or susceptibility to harm, lack of **capacity to cope and adapt.**	Bathymetry; substrate composition; locations of wetlands and river mouths; resistance (likelihood of mortality); recovery time of individual (years); plasticity or tolerance; heterogeneity (including biodiversity)	IPCC, 2018; Adger (2006)
Risk	The **potential for adverse consequences from a climate and human-related hazard for socio-ecological systems, resulting from the interactions between the hazard and the vulnerability and exposure of the affected system**. Risk integrates the likelihood of exposure to a hazard and the magnitude of its impact. **It can be expressed in probabilistic or relative/semi-quantitative terms.**	Biological risk, physical risk, chemical risks.	Adapted from IPCC, 2018

The ambition of trying to unify the terminologies in use by the different research communities is out of scope, but MaCoBioS, through its WP2, can instead contribute significantly by providing communication interfaces and operational tools for risk appraisal across its eco-regions.

References

- Adger, W. N. (2006). Vulnerability. Global Environmental Change, 16, 268–281.
- Haines-Young, R. and Potschin, M. (2013): Common International Classification of Ecosystem Services (CICES): Consultation on Version 4, August-December 2012.
- Haines-Young, R. and M.B. Potschin (2018): Common International Classification of Ecosystem Services (CICES) V5.1 and Guidance on the Application of the Revised Structure.
- IPCC (2018). Global Warming of 1.5°C. Summary for Policymakers. October 2018.
- Kristensen, P. (2004). The DPSIR framework. 1–10.
- Maxim, L., Spangenberg, J. H., O'Connor, M., 2009. An analysis of risks for biodiversity under the DPSIR framework. Ecol Econ. 69, 12–23.
- Neves, R., Baretta, J., Eds, M. M., Press, I. S. T. (2008). The DPSIR framework applied to the integrated management of coastal areas. (October). https://doi.org/10.13140/2.1.3841.6960
- Oesterwind, D., Rau, A., & Zaiko, A. (2016). Drivers and pressures - Untangling the terms commonly used in marine science and policy. Journal of Environmental Management, 181, 8–15. https://doi.org/10.1016/j.jenvman.2016.05.058

WORKSHOP DICTIONARY

EXAMPLE OF MRAF

To provide you a simple idea of how we expect to structure the MRAF we report below a **simplified MRAF** as extracted from Furlan et al. (2019).

However, we invite you to go through the readings reported in the next section to get more detailed information and knowledge to be ready for our workshop!!!

WORKSHOP DICTIONARY

DIG IN DEEPER THROUGH SOME READINGS

Halpern, B.S., Walbridge, S., Selkoe, K.A., Kappel, C.V., Micheli, F., D'Agrosa, C., and Watson, R., 2008. A global map of human impact on marine ecosystems. Science 319, 948-952.

Menegon, S., Depellegrin, D., Farella, G., Gissi, E., Ghezzo, M., Sarretta, A., Venier, C., and Barbanti, A., 2018. A modelling framework for MSP-oriented cumulative effects assessment. Ecological Indicators 91, 171-181.

Furlan, E., Slanzi, D., Torresan, S., Critto, A., and Marcomini, A., 2020. Multi-scenario analysis in the Adriatic Sea: a GIS-based Bayesian network to support maritime spatial planning. Science of the Total Environment 703, 134972.

Furlan, E., Torresan, S., Critto, A., Lovato, T., Solidoro, C., Lazzari, P., and Marcomini, A., 2019. Cumulative Impact Index for the Adriatic Sea: accounting for interactions among climate and anthropogenic pressures. Science of the Total Environment 670, 379-397.

AGENDA

INTRODUCTION (14:00 - 14:30)
Connect to the plenary Zoom room

- **Introduction to the MaCoBioS project - Ewan Trègarot (UoP)**
- **WP2: challenges and needs - Elisa Furlan (CMCC)**
- **MRAF co-design: the rules of the game - Elena Allegri (CMCC)**

WORLD CAFE' DISCUSSION (14:30 - 15:15)
Connect to the Zoom room you have been assigned

BREAK (15:15 - 15:30)

CO-DESIGN THE MRAF (15:30 - 16:30)
Connect to the Zoom room you have been assigned

BREAK (16:30 - 16:45)

WRAP UP ALL TOGETHER (16:45 - 17:15)
Connect to the plenary Zoom room

CONCLUSION (17:15 - 17:30)

LOGISTIC AND CONTACTS

Link to ZOOM PLENARY ROOM (Introduction and plenary session):
https://us02web.zoom.us/j/85977373416?pwd=SjM0RnNsWEhWUXNMb2QyOENWSE9Wdz09
Meeting ID: 859 7737 3416 Passcode: 553184

DESCRIPTION	ROOM 1	ROOM 2	ROOM 3
Moderator 1	Elisa Furlan	Vuong Pham	Silvia Torresan
Moderator 2	Silvia de Juan	Cindy Cornet	Ewan Tregarot
Supporter	Elena Allegri	Christian Simeoni	Alicia N'Guetta and Federica Zennaro
Participants (based on Doodle results)	Pierre Failler Torsten Krause Cristina Seijo Gema Casal Matthijs van der Geest Clement Madelaine Sylvain Couvray Justin Ahanhanzo Giovanni Coppini	Jean-Philippe Maréchal Fabiola Espinoza Catarina Fonseca Andrea Critto Simon Cragg Callum Roberts Karima Degia Stein Fredriksen Diego Kersting	Erik Meesters Andrea Zita Botelho Gianluca Ferraro Beth O'Leary Georg Heiss Juan Pablo D'Olivo Cordero Hazel Oxenford Jonathan Suau Mialy Andriamahefazafy
Link to the room	https://unive.zoom.us/j/89560241090 Meeting ID: 895 6024 1090 Passcode: 9uDk5A	https://unive.zoom.us/j/85733017210 Meeting ID: 857 3301 7210 Passcode: cf3g4R	https://unive.zoom.us/j/84437662768 Meeting ID: 844 3766 2768 Passcode: 2ren0S

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