

Deliverable 1.1.1

MPA4Change toolkits

Fine-tuning of Nature-based Solutions to face Climate Change

This document aims to recognise and summarise the potential fine tuning of toolkits developed to support the integration of climate adaptation actions into MPA management plans. The goal is to strengthen the Marine Protected Areas' (MPA) role to face Climate Change Adaptation and Mitigation Plans. The toolkits are ready to use and to be transferred, however some updates and improvements have been identified. The fine tuning is mainly based on the toolkits developer's feedback and from lessons-learned obtained from the implementation of the toolkits in several MPAs across the Mediterranean during the previous projects MPAEngage and MPA Adapt. A "new" toolkit, the restoration protocols, has been identified as necessary to complement the toolkits for Climate Change Adaptation and Mitigation Plans. In fact, the restoration protocol toolkit will capitalise, as it is the case for the other toolkits from protocols delivered and tested in previous and ongoing projects. Overall, six toolkits are considered: 1) Climate Change Monitoring Toolkit, 2) Vulnerability and Risk Toolkit, 3) Restoration Toolkit, 4) Citizen Science toolkit, 5) Participatory Approach, 6) Climate Change Adaptation and Mitigation Plans Toolkit and 7) Communication Toolkit. The document is organised in three main parts, i) identification of fine tuning actions for each toolkit, ii) the selection of the fine tuning actions that will be implemented during the MPA4Change project and iii) mapping of current and potential Takers of the toolkits from which the feedback and recommendations have been already obtained and others that can be interested in adopting them.

<https://mpa4change.interreg-euro-med.eu/>

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MPA4Change





Deliverable 1.1.1

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MPA4Change in a nutshell

MPA4Change main objective is to enhance the role of Marine Protected Areas (MPAs) and restoration as Nature-based Solutions for climate change adaptation. Building on previous projects and in line with the EU Biodiversity Strategy objectives, this initiative has resulted in the development of an action plan for Mediterranean MPAs in view to ensure its long-term sustainability and capacity.

The creation of this Action Plan for MPAs to ensure its long-term sustainability and improve their resilience has been done by covering the following areas of work;

- By providing validated toolkits on climate change adaptation and building the capacity of MPA to implement them.
- By supporting the policy dialogue at Mediterranean and European level.
- By supporting the implementation of the action plan through the creation of a roster of experts that provides guidance in this process beyond the project duration.

Additionally, during MPA4Change, a new initiative aimed to provide an operational framework to the roster of experts' work has been created: the 100MPA MedAlliance.

This collaborative initiative aims at enhancing the resilience to climate change and effectiveness of the Mediterranean MPAs System by integrating climate adaptation strategies in 100 MPAs across the basin by the year 2030.

More information on the 100MPA MedAlliance can be found at its dedicated website: <https://100mpamedalliance.org/>



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Introduction

Marine Protected Areas (MPAs) are key to protect and restore marine ecosystems and increase their resilience to the drastic impacts of climate change in the Mediterranean Sea. However, despite the importance of these management systems, many challenges remain for managers and policymakers to effectively implement climate-resilient conservation and restoration actions in Mediterranean Marine Protected Areas (MPAs).

The Interreg-EuroMed funded project MPA4Change, builds upon previous research projects that have developed tools to adapt protected areas to climate change and develop effective climate adaptation and mitigation plans. The objective of this deliverable is to take stock of these tools (Fig.1) and fine-tune the toolkits to be ready to use and implement in different regions, within and beyond the Mediterranean Sea.

What is a toolkit?

A **toolkit** is a set of resources designated to facilitate specific tasks or processes. It includes protocols and guidelines and, in some cases, dedicated web platforms that help achieve the expected outcomes.

On the other hand, a **protocol** is a detailed plan or set of instructions outlining the steps to be followed to achieve a specific task or objective. Protocols are essential components of some of the toolkits, providing structured methodologies required for reliable execution and better outcomes.

Finally, for most toolkits a **training program** has been developed with the support of e-learning platforms.

Which toolkits?

MPA4Change promotes the adoption of 7 toolkits covering the different elements required for the development and implementation of adaptation action plans in the Mediterranean MPA and beyond (Fig. 1). In the following paragraph a brief description of each toolkit is provided.

1- **Climate change monitoring toolkit**. The Harmonised Monitoring protocols include 11 protocols complemented by e-learning materials, supporting the entire process from data collection to final assessment (see Annex 1 for further information on monitoring protocols).



2- **Restoration toolkit**. This toolkit compiles the most efficient and effective restoration protocols for the main coastal habitats and habitat forming species in the Mediterranean.

3- **Citizen Science** is encouraged through three specific monitoring protocols for mass mortality, fish visual census, and *Pinna nobilis* assessment, with data managed via the “Observadores del Mar” platform (www.observadoresdelmar.org).

4- **Vulnerability and Risk Assessment toolkit** incorporates guidelines and an online tool that offer a methodological framework for evaluating social-ecological climate vulnerability in MPA.

5- A **Participatory Approach** involves guidelines for stakeholder engagement using a Quintuple Helix model, followed to create climate action plans.

6- **Communication tools**, including a website, social media channels, an illustrated booklet, webinars, an animated cartoon, video clips, and a deliverables database, are essential for disseminating information and engaging stakeholders.

7- **Climate Change Adaptation and Mitigation Plan** guidelines provide a step-by-step process for developing local climate action plans through participatory decision-making.

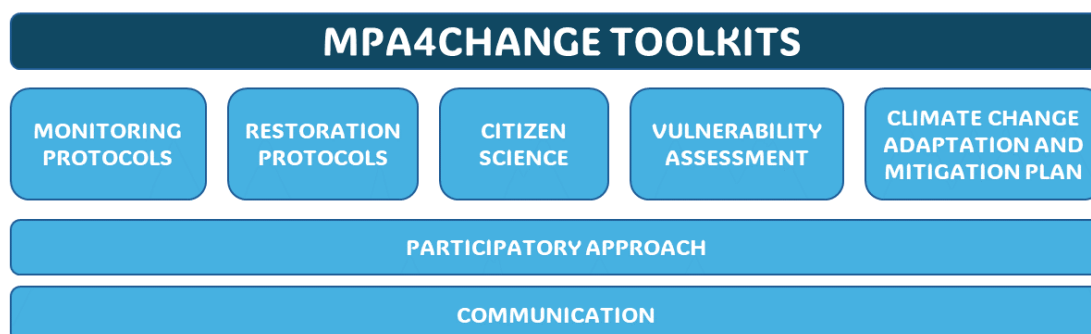


Fig. 1 MPA4Change toolkits.

See Annex 1 for a full listing and description of the toolkits and protocols.

This deliverable has been organised in 3 sections, first is the fine tuning objectives for the 7 toolkits. The second section is dedicated to the selection of fine tuning actions that will be implemented during MPA4Change. Finally, the third section is the identification and mapping of current and potential takers (users of the toolkits).



Approach

This document outlines the process of identifying improvements to the various tools developed in previous projects, most of them from the MPAEngage Interreg-Med project. These improvements are based on the feedback provided by the partners who have implemented the toolkits before. This process was facilitated through the creation of a collaborative Excel file, where different partners could propose changes based on their field experiences using the tools. These recommendations and improvements have been compiled and are presented in this document. They have been used to create a list of Actions including a brief Description to enhance the functionalities provided and thus their transferability to the Mediterranean MPAs network during the MPA4Change project and beyond. The information regarding this issue is found in the collaborative Excel file “Fine-tuning implementation List”.

Since the process of implementing the proposed changes will go beyond the time and resources within the MPA4Change, we identified the list of fine-tuning actions that will be conducted during the first year of the project in view to have them operational for the transfer activities planned in the 2nd year of the project. Each action will be followed by a description to detail why it is suggested and how it can be done. Next section details the specific changes and refinements proposed for each of the 7 toolkits with the different Actions and Descriptions.

Finally, to identify potential takers of the tools: these are i.e., organisations and institutions that already take some of the tools and others that never used them but may be interested in using the improved toolkits. For this purpose, another collaborative Excel file called “Potential takers mapping” has been created, allowing partners to contribute with their knowledge about the toolkit potential users. The information collected includes the name of the institution or organisation, the country where they are located, whether they have a marine protected area assigned to them, and the source of the contact (e.g., registration and attendance at previous webinars, registration on the TMEDNet platform, previous contact of the partner, or other connections, where we ask them to explain their relationship).

For each organisation/institution has been assigned to the appropriate stakeholder type in a new excel called “Potential takers My maps”. The categories defined are:

- National Governmental Agencies
- Regional Governmental Agencies
- Local Governmental Agencies
- International Agencies



- MPA/NP Managers
- Professional Associations
- Recreational Associations
- Citizen Associations
- Industry and private Associations
- NGOs
- Academia, Research & Education
- Media, Art & Culture

Using this classification, we created a pie chart that illustrates the percentage weight of each stakeholder category, offering insights into the relative influence and representation of different groups within the project.

Furthermore, a map has been developed using the *My Maps app* by Google. This online tool allows you to use the *Google Maps* location for each organisation/institution but, in order to avoid possible location errors, each organisation's or institution's location was individually searched and verified before being added to the "Potential takers My maps" Excel sheet, which was subsequently uploaded to My Maps with the information. Map locations have been created showing the position of each stakeholder added by the partners.

Identification of potential Fine-tuning Actions

As described above, we identified the potential fine-tuning actions for each of the toolkits. To facilitate this process a collaborative "Tools contact person" Excel sheet was created on Google Drive, where partners introduced the improvements to each tool based on their implementation experiences and the feedback from other takers. This input was used to compile a list of toolkit enhancements. To make the recommendations more comprehensible, the fine-tuning actions have been categorised into 4 groups depending on the purpose of each fine-tuning proposal:

1. Updating existing materials or protocols: this category includes the recommendations related to revising the existing material, with some changes that do not involve creating new content or protocols.
2. Refinement of methodological aspects of the existing protocols: this category includes the recommendations aimed at modifying and improving the methodology of the various protocols and tools.
3. Development of new material or protocols: this category is for adding recommendations for creating new protocols to strengthen the toolkits.



4. Data management and interpretation: this category includes the update of website platforms and dedicated applications.

What follows is a list of the toolkits with fine tuning proposals from partners to improve the toolkits, following 4 types of recommendation types described above. Note that only the categories where there are recommendations are included for each of the toolkits.

3.1 Climate change monitoring toolkit

3.1.1 Development of new material or protocols

LEK on sea-urchins

- Action: new LEK protocol on sea-urchins.
- Description: Elaborate a survey to understand the fluctuations and possible mass mortalities of the most common sea urchin species.

Fish Visual Census (FVC)

- Action: Update list of species in Fish Visual Census (FVC)
- Description:
 - Add the following list of species into the FVC protocol:
 - *Labrus bergylta* and/or *Ctenolabrus rupestris* (species with temperate boreal affinities on the south border of its distribution)
 - *Ctenolabrus rupestris* (species with temperate boreal affinities)
 - *Pomadasys incisus* (already present in the Algarve and Macaronesia)
 - *Parapristipoma octolineatum* (already present in the Algarve)
 - Maintain the following list of Mediterranean Sea species in the board:
 - *S. cabrilla*, *C. julis**, *S. salpa* (resident and common species in the Atlantic Iberia including Portugal)
 - *E. marginatus* (common in Macaronesia -Azores, Madeira and Canaries, but rare and endangered in Portugal mainland)
 - *T. pavo* and *S. scribea* (common in Macaronesia, but rare in Portugal mainland)
 - *S. cretense* (common in Macaronesia, but very rare in Portugal mainland, only a few observations)

* Males of *C. julis* with different colours in Med, Portugal and Macaronesia.



For all protocols

- Action: Creation of new e-learning materials to feed existing e-learning platforms such as Europarc and DAN
- Description: Updated materials will be fine-tuned to support these e-learning platforms.

3.1.2 Refinement of methodological aspects of the existing protocols

LEK 1

- Action: refinement of the species list to fit the new geographical scope.
- Description:
 - Provide a list of species for each regional geographical area in the Mediterranean (Ligurian Sea, Tyrrhenian, Adriatic, etc.).
 - Have the possibility to add additional species by fishers, according to area and personal willingness by providing a blank cell to add other species (beside fish species) such as mollusc, Echinodermata or others. The list can be useful to detect future LEK needs or monitor a specific specie in a specific area that can one day be a sentinel of an upcoming change

Fish Visual Census of Climate Change Indicators

- Action: Refinement of the FVC to fit the new geographical scope.
- Description:
 - Adapt the Fish visual census board for different regional geographical areas by providing different slates for different macro regions such as the Adriatic Sea, Ionian Sea, Atlantic Ocean, etc.
 - Remove 5 minutes and insert the use of a 50m (approx.) metric rib to compare the data in the different monitoring protocols, also within the same site. If you have the time and not the length the protocol can not be performed during another visual census protocol (not adjustable).

Mass Mortality

- Action: Improve and complement waterboard with more phylum/species
- Description:



- Insert a way to report organisms impacted at a 100% level. Codify a way to report/distinguish the completely dead colonies, for example put a circle or a triangle for each dead colony.
- Work on a better and clearer division between phylum (sponges/cnidarians...).
- Facilitate an easier search and comparison
- Complement the underwater board with other phylum/species: provide a slate with Sponges and Bryozoa species with instructions, pictures and examples for the regions without gorgonians.
- For MPA with larger ranges of anthropogenic impact on its ecosystems a geographical presentation along with a spatial-temporal analysis might be beneficial as a management tool
- Specifically, for **Bryozoa and Sponges**:
 - Assessment of densities of the target species at certain depths or depths ranges is needed before starting the protocol.
 - Improving the explanations and definitions, for example, the information on depth ranges that would be considered as shallow, intermediate and deep was missing
 - Revise data table as it did not fill in automatically with this information once a surveyed depth per observation was entered.
 - Improve the tutorial and the slate with the listed Fine-tuning Action for the regions without gorgonians

POFA - Posidonia oceanica fast assessment

- Action: Collect information on the continuity/extension.
- Description: Include an additional transect to measure the continuity and extension of the meadow.

URCH - Sea urchins monitoring

- Action: Include the smaller sea urchins in the protocol (less than 1 cm).
- Description: Include a column in the monitoring protocol to record sizes of sea urchins of less than 1 cm. MPA with a large number of fish feeding on sea urchins have a large number of very hidden ones which are difficult to measure or are very small.



3.1.2 Data management and interpretation: Update website platforms and dedicated applications

Data visualisation tool for monitoring protocols: MPAEnagePowerBI

- Action: develop training materials to support the use of PowerBI.
- Description:
 - Design and develop new materials to support the users in the use of PowerBI.
 - Preparation of guided exercises including the basic functionalities with example datasets.
- Action: Update the PowerBI manual.
- Description: this manual will update the description of the main functionalities of powerBI and a section dedicated to solving the most common errors encountered by users. Some recommended fine tuning is:
 - The Excel file - pivot tables were not refreshed appropriately, and errors occurred while generating figures
 - Insert possibility to set the scale of figures
 - For the protocols not in use, possibility to give a blank page as an output (not data from other MPAs)
 - Program the excel cells to signal errors when the data entered is in the wrong format, for example by blocking the cell and not running the analysis. It's important to provide feedback on the error so that users can spot mistakes and amend them, and so that the results are more reliable.
- Action: Global MPA Assessment
- Description: using various indicators, the overall status of the MPA will be calculated.

TMedNet

- Action: Integrate all monitoring protocols in T-MEDNet.
- Description: At present the T-MEDNet platform has 3 protocols integrated: temperature, mass mortality and fish-visual census. The platform provides information to support the implementation of the protocols through all the processes from the implementation on the field, data management and interpretation. The current users consider that this is a valuable approach. Therefore, the integration of the rest of monitoring protocols in T-MEDNet will be a step-forward to facilitate the adoption of the proposed monitoring scheme.



- Action: Develop training materials to guide users in the navigation and use of T-MEDNet platform.
- Description: The T-MEDNet platform hosts a great amount of information and complex datasets. To help the users to navigate, take advantage and use the information that the platform provides, we propose to develop some “video-tours” to guide the users in the different sections of the platform.

Other Portals

Additional online portals for toolkit sharing will be considered, for example the AMARE geoportal or the ORMEF portal, among others.

3.2 Vulnerability and Risk Assessment

3.2.1 Data management and interpretation: Update website platforms and dedicated applications

- Action: Develop a short guide for the CVA tool
- Description: Complement the online tool with simplified guidance materials including a short manual and a video tutorial.
- Action: Open the refined tool to the users.
- Description: Test and optimise the online tool to be ready to share to MPAs without intervention by UniVigo.

3.2.2 Update existing material or protocols

- Action: Develop updated guidelines on the CVA
- Description: The updated guidelines for the Climate Vulnerability Assessment (CVA) will allow takers to conduct the assessment independently and will have all the updated materials available. This will facilitate the use of the interactive website to help users to resolve possible bugs without assistance by the team of Univ.Vigo that developed the toolkit. This document will provide the background and rationale to perform the vulnerability assessment as well as the links to the training materials produced. The basis of the document are all the materials prepared for the MPA-Engage project.



- Action: Simplify the required templates and adapt their instructions
- Description: All templates used for the CVA need to be revised in order to update the contents, make them consistent across one another and transferable to the new locations. Names, labels and sequence of the templates will be part of the updated guidelines.

3.2.3 Development of new material or protocols

- Action: Create an interactive CVA tool website with a shiny app.
- Description: The website application will make it easier to work with the tool where you will be able to find all the necessary documents: guidelines, short guidelines, templates, videos and webinars and the tool.
- Action: Creation of new e-learning materials to feed existing e-learning platforms such as Europarc and DAN
- Description: Updated materials will be fine-tuned to support these e-learning platforms.

3.3 Restoration toolkit

3.3.1 Update existing materials or protocols

- Action: Develop a marine restoration booklet for MPA managers.
- Description: Fine-tuning for the Restoration toolkit will consist of providing a single-entry document to guide MPAs managers in case they are willing to implement restoration actions within the actions of adaptation to climate change.
 - The restoration booklet will be based on the compilation of the documents and training materials produced by selected projects dedicated to marine restoration such as EU MERCES, Life AFRIMED and FORESTA.
 - The materials will be focused on the restoration protocols for Mediterranean coastal habitat-forming species and other potential key species.
 - The document will mainly provide access to relevant handbooks describing the implementation of restoration actions; however the document will facilitate access to other materials considered useful to guide the decision- implementation- process for the MPA managers.



3.3.2 Development of new material or protocols

- Action: Creation of new e-learning materials to feed existing e-learning platforms such as Europarc and DAN
- Description: updated materials will be fine-tuned to support these e-learning platforms.

3.4 Citizen Science toolkit

3.4.1 Update existing material or protocols

- Action: Define strategies to ensure that data is uploaded to Observadores del Mar platform.
- Description: Data restitution only through OdM and convince divers to upload on OdM.
- Action: Training for diving centres and instructors.
- Description: all protocols need training. Also, in order to have an effective citizens' engagement in the protocols, all of them need to be:
 - Standardised
 - Simply and accessible
 - Divers need to receive feedback to remain engaged (eg. input the data in a platform like OdM).
- Action: Promoting the data obtained by OdM to MPA managers.
- Description: All the data obtained on a daily basis by the divers can be useful data for MPA managers. Even if the data is from a place outside of the MPAs this data can be useful to compare the management effectiveness or alarm that a new species is coming or used to be integrated in measures that can result in better management and higher protection.

3.4.2 Development of new material or protocols

- Action: Produce new/or update current materials for Diving operators to enhance the business value to engage divers in CS.
- Description: CS protocols need to be supported by training materials (manuals, procedures, video tutorials, slates).



- Action: Creation of new e-learning materials to feed existing e-learning platforms such as Europarc and DAN
- Description: Updated materials will be fine-tuned to support these e-learning platforms.

3.5 Participatory approach

3.5.1 Update existing material or protocols

- Action: update guidelines.
- Description: update the materials so that they are ready to be used by takers and explain the benefits in the forefront:
 - The guidelines are great for actively engaging stakeholders, especially for those who have to start the process from scratch or never approached a structured participatory approach.
 - For MPAs that already have participatory approaches among their activities, these guidelines may be useful for improving their participatory processes or for additional inspiration, although they will follow their path and they will not change the activities already in place.
- Action: Stakeholder mapping and engagement strategies.
- Description: Inputs from Europarc materials and specific guidelines on how to map stakeholders and how to prioritise them according to specific criteria like: how much they influence an MPA, how impacted they are by the MPA and so on.

3.5.2 Development of new material or protocols

- Action: Creation of new e-learning materials to feed existing e-learning platforms such as Europarc and DAN
- Description: Updated materials will be fine-tuned to support these e-learning platforms.

3.6 Climate Change Adaptation and Mitigation Plan toolkit

3.6.1 Update existing material or protocols

- Action: Link to the other toolkits.



- Description: this toolkit is heavily connected to other toolkits such as the vulnerability assessment, and this can be updated and better refined in the relevant comments. For example, the stronger the results of the vulnerability assessment are, the better they will inform the adaptation action plan (the vulnerability assessment is a summary of the monitoring, stakeholders' knowledge, citizen science and participatory approach).
- Action: Pre-defined lists of potential adaptation and mitigation measures.
- Description: It will be useful to provide some examples of management actions to adapt and mitigate the effects of Climate Change on the species and habitats and social economical activities. These examples can be a list of measures implemented by the MPA that tested or implemented this protocol before.
- Action: Recommendations for the adoption of the plan.
- Description: It would be useful to provide some guidance on how the Adaptation and Mitigation Plan can inform or be part of the MPA management plan. This would guarantee the full implementation of the Adaptation action plan.
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3.6.2 Development of new material or protocols

- Action: Creation of new e-learning materials to feed existing e-learning platforms such as Europarc and DAN.
- Description: Updated materials will be fine-tuned to support these e-learning platforms.

3.7 Communication toolkit

3.7.2 Development of new material or protocols

- Action: New communication toolkit for MPA
- Description: Develop the materials needed for a communication toolkit.



Fine-tune list for commitment implementation

The following Table 1 illustrates how the collaborative “Fine-tuning Implementation List” Excel sheet is organised to help decide which improvements will be implemented during the project. The selected recommendations are to be carried out within this year, resulting in the final refined tools for December 2024.

Table 1. List of fine-tuning actions and commitments over the project MPA4Change (Summarised from from: Fine-tuning Implementation List)

Toolkit	Category	Protocol/ Tool	Fine-tune Action	To do (y/n)	Lead & Partners involved
Climate Change Monitori ng	Development of new material or protocols	LEK Sea Urchin	LEK Sea Urchin		Sara Bonanomi, Ernesto Azzurro, Andrea Blašković, Lorenzo Merotto
		FVC	Update the list of species	Yes	
	Refinement methodological aspects of the existing protocols	LEK 1	Provide a list of species for each geographical scope		
		FVC	Refinement of the FVC to fit the new geographical scope		
		Mass mortality	Improve and complement waterboard with more phylum/species		
		POFA	Collect information on the continuity/extension		
		URCH	Include also the smaller sea urchins (less than 1 cm)		
	Data management and interpretation	MPAEnagePo werBI	Develop training materials to support the use of PowerBI		
			Update the PowerBI manual		
		TMedNet	Integrate all monitoring		



			protocols in T-MEDNet.		
			Develop training materials for T-MEDNet platform		
		Other portals	AMARE geoportal or the ORMEF portal, among others		
Vulnerability and Risk Assessment	Data management and interpretation	CVATool	Develop a short guide for the CVA tool	Yes	Elena Ojea, Silvia Rayo, Juan Bueno Pardo, Julia Ameneiro, Andrea Blašković, Lorenzo Merotto
			Open the refined tool for the users	Yes	
	Update existing material or protocols		Develop updated guidelines on the CVA	Yes	
			Simplify templates and instructions	Yes	
	Development of new material or protocols		Create an interactive CVA website with shiny app	Yes	
			E-learning materials for Europarc, DAN and others		
Restoration toolkit	Update existing materials or protocols	Restoration protocols	Develop a marine restoration booklet for MPA managers	Yes	Joaquim Garrabou, Jana Verdura
	Development of new material or protocols		E-learning materials for Europarc, DAN and others		
Citizen Science	Update existing material or protocols	CS Protocols	Define strategies to ensure that data is uploaded to Observadores del Mar	Yes	Fabio Figurella, Massimo Casabianca, Vania Sessa, Andrea Blašković, Lorenzo Merotto
			Training for diving centres and instructors	Yes	
			Promoting the data obtained by OdM to MPA manages	Yes	



	Development of new material or protocols		Produce new/or update current materials for Diving operators to enhance the business value to engage divers in CS	No	
			E-learning materials for Europarc, DAN and others		
	Refinement methodological aspects of the existing protocols	Mass mortality protocol	Insert a way to report organism impacted at 100%		
			Better and clearer division between phylums		
			Easier search and comparison		
			Underwater board with other phylum/species		
			Geographical presentation along with a spatio-temporal analysis in large MPA		
Participatory approach	Update existing material or protocols		Update guidelines		Andrea Blašković, Alena Sprčić, Martina Hervat, Lorenzo Merotto, Valentina Capanera
			Stakeholder mapping and engagement strategies		
	Development of new material or protocols		E-learning materials for Europarc, DAN and others		
Climate Change Adaptation and Mitigation Plan	Update existing material or protocols		Link to the other toolkits		Lorenzo Merotto, Valentina Capanera, Andrea Blašković, Alena Sprčić
			Pre-defined lists of potential adaptation and mitigation measures		
			Recommendations for the adoption of the plan		
	Development of new material or protocols		E-learning materials for Europarc, DAN and others		
Communication	Development of new material or		New communication toolkit for MPA		



toolkit	protocols				
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Potential takers mapping

The potential users of the various tools primarily originate from three sources: i) participants to the MPA-Engage training webinars, ii) individuals and organisations registered as users on the TMedNet platform, and iii) project connections and partnerships. Project partners have completed the “Tools_contact person” excel sheet detailing the source of contacts, their contact information, the organisation or institution they belong to, and the assigned MPA. With this initial data mapping, we can contact and engage the potential users through workshops, webinars, or other means.

The data for the stakeholder analysis (Fig.2) was provided by partners of the project who identified these stakeholders as particularly relevant for using and promoting the different toolkits. The predominance of MPA managers, Academia and Research and National Government Associations emphasise the importance of aligning the toolkit with management practices, research and policy frameworks.

Potential takers

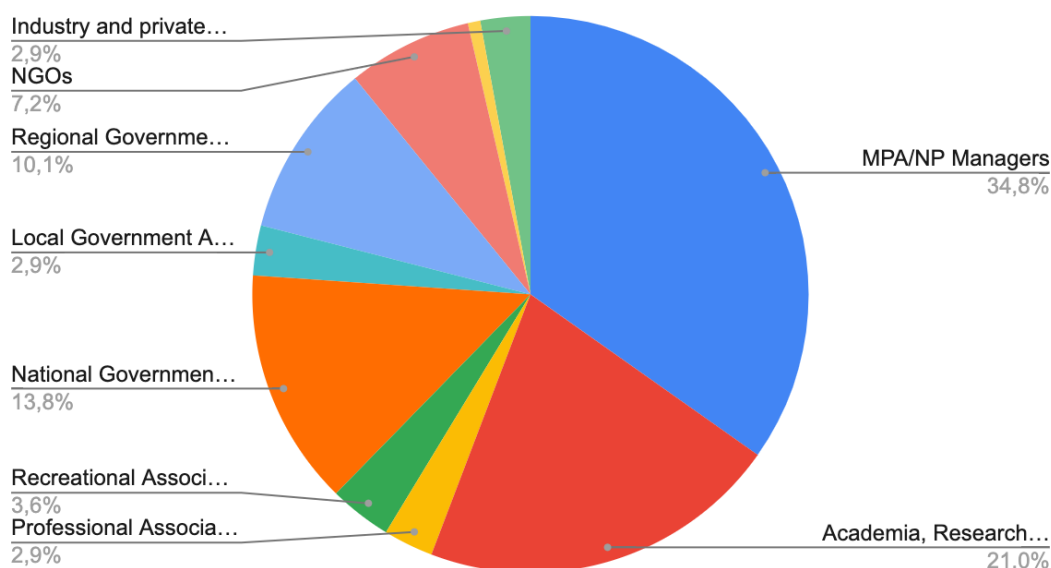


Fig. 2 Stakeholder groups potentially interested in toolkit utilisation.

Additionally, a map (Fig.2) has been created to illustrate the geographical diversity of the potential takers identified as being interested in the toolkits. On the map you can explore each point to check the institution/organisation name, if there is any associated MPA, additional comments, and the partner who provided the information. This map is particularly useful for understanding the geographical scope of the project's potential impact, offering a spatial perspective on how extensively the project can reach.

MPA4Change Toolkit Takers Mapping



Fig 3. Potential users map (*My maps Google*):

[\[https://www.google.com/maps/d/edit?mid=16M1WLCtYrhfYQ4eXZ3FX92MeGr4Ylj8&usp=sharing\]](https://www.google.com/maps/d/edit?mid=16M1WLCtYrhfYQ4eXZ3FX92MeGr4Ylj8&usp=sharing)



Extra Material

Annex 1. Summary description of each tool and protocol.

Tool	Description	Protocol	Description
Harmonised monitoring	The 11 MPA Engage monitoring protocols are complete toolkits, ready to be used and transferred. These toolkits are complemented by e-learning materials such as presentations, video-tutorials and tools to assist the process of data collection and analysis. All together, these materials provide a system to support the entire process, from the data collection (monitoring), to the analysis and interpretation of data, up to the final assessment of climate change impacts	LEK 1: Exploring Local Ecological Knowledge to reconstruct historical changes	How to interview experienced fishers or other sea users, to reconstruct historical changes in species abundances and distribution
		LEK 2: Exploring Local Ecological Knowledge for periodical monitoring	How to interview experienced fishers or other sea users, to regularly (every year) monitor climate-sensitive species of both native and exotic origin
		LEK 3: Exploring Local Ecological Knowledge for mass mortalities	How to interview divers and fishers to access their knowledge about mass mortality events
		Temperature conditions	Designed to acquire long-term and high resolution information on temperature conditions along the depth gradient in coastal waters
		Mass mortality	Aims to quantify the degree of affected specimens by mass mortality events within the surveyed populations
		FVC (Fish Visual Census)	Simplified visual census methodology to monitor changes on fish distribution and abundance on a set of coastal fish species. Specifically intended to be used by a wide group of observers over large geographical scales and on a periodical basis.
		URCH (Sea Urchin population)	Determine the structure and the dynamics of sea-urchins populations in the shallow rocky habitats within the MPAs.
		BHARA (Benthic Habitat Rapid Assessment)	Monitoring changes on biological characteristics, species composition, the arrival and colonisation of non native species as well as the impacts of major disturbances such as climate change
		POFA (<i>Posidonia oceanica</i> Fast Assessment)	Aims to define the conservation status of <i>Posidonia oceanica</i> meadows by assessing the density of the leaf shoots, which is one of the main structural



			descriptors of the meadow health condition.
		FAP (Fast Assessment of <i>Pinna nobilis</i> Conservation)	The main objective is to determine the abundance, the size structure and the health status of <i>Pinna nobilis</i> populations within the MPAs.
		SFM (Photogrammetry as monitoring tool for benthic habitats structure and dynamics)	The main objective is to document and measure habitat complexity and distribution patterns of populations of key species, tracking their changes over time owing to several stressors including climate change.
Citizen Science (CS)	The MPA-Engage three monitoring protocols for citizen science activities: The selected protocols are: the a) Mass Mortality Monitoring, the b) Fish Visual Census and the c) <i>Pinna nobilis</i> fast assessment. For these 3 protocols the marine Citizen Science (CS) web platform Observadores del Mar (OdM) already presents three projects ensuring that the data collected could be uploaded, validated and transferred to the MPAs that potentially might use these data.		
Participatory Approach	The MPA Engage Guidelines for applying a Quintuple Helix Participatory Approach aim to guide the stakeholders' engagement and public participation processes that are key for the elaboration of a climate change mitigation and adaptation action plan. These guidelines help identify the stakeholder groups to be involved in the elaboration of an action plan and also feature the tools to inform and engage them in the decision-making process.		
Communication	The main objective of the communication tool is to disseminate information and engage stakeholders effectively. The MPA Engage website serves as the primary information hub, while social media channels on Twitter, Facebook, Instagram, and YouTube enhance public engagement and awareness. The "Boiling Mediterranean" booklet, available in multiple languages, illustrates the rapid changes in Mediterranean ecosystems. A series of webinars, an animated cartoon on climate change, and "MED Together" video clips further promote understanding and involvement. Additionally, a deliverables database consolidates all project outputs for easy access.		
Vulnerability and Risk Assessment	These guidelines provide a methodological description on how to implement a social-ecological climate vulnerability assessment in MPAs. The methodology relies on an indicator-based approach, which combines exposure and sensitivity to climate change, with the adaptive capacity in both the ecological and social dimensions. The methodology is designed to be reproducible and replicable in other Mediterranean MPAs.		
Climate Change Adaptation and Mitigation Plan	These guidelines aim to facilitate the elaboration of local climate change mitigation and adaptation plans. The document is a quick guide that will lead through a step-by-step process to the elaboration of the aforementioned plans via setting up a participatory decision-making process.		