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Agenda item 4: Data management and data flows implemented for UNEP/MAP reporting towards an integration into the Knowledge Management Platform

MAP Knowledge Management Strategy for the Mediterranean Sea

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1. Principles and vision

In a world rapidly evolving, where changes are strictly tied to technology and environmental drivers, maintain knowledge integrity is an obligation to better shape the future of humanity. This shape is not only in the hands of politicians or policy makers, but also it relies on communities of interests, stakeholders and single citizens. The Mediterranean Sea is a particularly sensitive environment for its environmental characteristics and geopolitical situation. In this panorama UNEP-MAP proposes itself as a force which unifies, and not divides, pursuing common interests on the Mediterranean Sea, through consultations, mediation and coordination on common values for the major benefit of all the CPs. In this sense the Knowledge Management Strategy is needed to capitalize the outcomes of UNEP-MAP efforts so far: in the framework of UNEP-MAP data policy implementation, the Knowledge Management Strategy collects the outcomes of cooperation between Barcelona Convention Contracting Parties (CPs), National Focal Points (NFPs), and Regional Activity Centers (RACs), guaranteeing safeguard on Mediterranean knowledge heritage already built, augmenting and improving existent datasets, presenting the background work pursued, novel tendencies and driving principles of Knowledge Management in UNEP-MAP. The Knowledge Management Strategy is supported by two main implementation tools: the Data Policy and the Knowledge Management Platform (KMaP).

The present strategy, not limited to data, encompasses also information and knowledge.

To briefly recall some key definitions, as per the DIKW pyramid (Figure 1): **data** are independent and objective elements that can be used across different contexts and for multiple different purposes, **information** are data contextualized (e.g. data used in a specific research project) where they assume a precise meaning and relevance, **knowledge**, in turn, is information coupled with the human experience in a way that information becomes part of ones' background and it can be used in different contexts to draw connections, links and make associations for the benefit of the community.



Figure 1. The DIKW pyramyd scheme.

1.1. Objectives of the strategy

The strategy aims to achieve the following objectives:

- Strengthen the collection, harmonization, management and dissemination of knowledge including technical data and information for the protection of the Mediterranean Sea and coasts.
- Establish a centralized hub, a single access point, for the Mediterranean Sea knowledge on environmental topics of Barcelona Convention to leverage participation and dialogue between decision makers, researchers and stakeholders.
- Promote the adoption of communication models for the engagement of citizens and stakeholders in Mediterranean policies through social communication campaigns, providing interactive tools such as dashboards and digital maps.

- Raise public awareness by promoting environmental monitoring best practices and virtuous attitudes for the management of environmental and marine resources according to co-participation and public engagement approaches through the development of digital tools for consultation and interaction with specialized contents.
- Facilitate the timely exchange of data, information and publications to enhance both the internal and external communication for the MAP System.
- Provide a reliable reference platform for stakeholders, decision makers, researchers in the Mediterranean area.

1.2. Global context and experiences

A Knowledge Management Strategy is as necessary as long a wide variety of challenges are faced by the humanity within a context of rapid technological evolution: (i) the information overflow, often blurring the critical approach to news; (ii) the big amount of new data (e.g. sensors data), taken in quasi real time, that require huge computational and rapid analysis capacity; (iii) the rising of artificial intelligence as a partial response to computational and analysis demand, whose power needs to be carefully canalized ad guided to answer specific issues; (iv) high potential of integrated data in decision-making processes: given the big amount of different data (environmental, financial, societal, etc.), their integration produces a set of new information which must be capitalized; (v) radical change in data and information organization: novel tendencies enhance a decentralized management of data, so data are collected once, shared many times; (vi) persistent gap among countries in access to knowledge.

During the last years some practical actions have been put in place to answer these challenges and Knowledge Management has been approached from different institution at international level such as:

- the Africa Knowledge Management, founded by the European Union and implemented by its Joint Research Centre aiming to collect all environmental data from African countries and make them easily parsable online mainly for citizens (<u>https://africa-knowledge-platform.ec.europa.eu/</u>);
- the GPML platform (Global Partnership on Marine Litter), a project funded by the United Nations, which presents data on marine litter with a global coverage (<u>https://digital.gpmarinelitter.org/</u>).
- the World Environmental Situation Room (<u>https://wesr.unep.org/</u>) of UNEP, aiming to collect data, platforms, initiatives in the environmental field, at national, regional and global level, framing all of this within the Sustainable Development Goals.
- the Pacific Data Hub, aways framed into the SDGs context aims to make available data, indicators and tools from the Pacific communities (<u>https://pacificdata.org/</u>).

All the above-mentioned examples have in common pursuing an Open Data policy. Even if at different levels and with different means, they all connect data from different data source, they all implement policies which consider data as a public good, and their availability is fundamental for human sustainable development.

Moreover, emerging trends in the field of Knowledge Management indicate the always more pervasive presence of Artificial Intelligence, and first experiments indicate that its use, coupled with instruments already consolidated such as Large Language Models, highly leverages the efficiency of knowledge sharing.

1.3. The principles

Together with a growing interest in capitalization of knowledge, the need for a correct management of data/information is even more necessary. In this sense, key principles have been formulated so far such

as TRUST (Transparency, Responsibility, User-focus, Sustainability, Technology – Lin at al., 2020), CARE (Collective benefit, Authority to control, Responsibility, Ethics – Carroll et al., 2021) or FAIR (Findable, Accessible, Interoperable, Reusable – Wilkinson et al., 2016). While the final aim of all these principles is to ethically and efficiently manage data, with respect to the three main groups cited, FAIR data management results to be the more complete set of principles. In fact, FAIR data management not only gives rules for practical implementation of these principles also by means of technical details, but the right application of FAIR principles leads to data transparency, acknowledgement of responsibility, a complete control over the data flows for the ultimate user benefit, which is the reuse of data in different contexts. For this reason, this strategy is based on the four pillars of FAIR data management.

Firstly introduced by Wilkinson et al. in 2016, FAIR data management suggests that data, metadata and infrastructures should be managed in a way that they are:

- **Findable**: data must be indexed from the search engines, they must be identified by a univocal and persistent Uniform Resource Identifier (URI).
- Accessible: access procedure to data must be clear, metadata must be standard and identified by a persistent identifier that, eventually, survives data.
- **Interoperable**: data and metadata must be shared using standard formats or vocabularies, allowing for machine to read them in a way that they can interact with other applications/tools for analysis, storage, and processing purposes.
- **Reusable**: data must be extensively described, meet domain-relevant community standards, shared using a license that allows for a wider and real reuse of data (data manipulation and recombination must be allowed).

These four principles find a practical application in a set of rules and practical examples detailing the principles put in place by the go-FAIR initiative (<u>https://www.go-fair.org/</u>) that are:

For Findability:

F1. (Meta)data are assigned a globally unique and persistent identifier.

F2. Data are described with rich metadata (defined by R1 below).

F3. Metadata clearly and explicitly include the identifier of the data they describe.

F4. (Meta)data are registered or indexed in a searchable source.

For Accessibility:

A1. (Meta)data are retrievable by their identifier using a standardised communications protocol which is open, free, and universally implementable (A1.1) and it allows for an authentication and authorisation procedure, where necessary (A1.2).

A2. Metadata are accessible, even when the data are no longer available.

For Interoperability:

11. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2. (Meta)data use vocabularies that follow FAIR principles.

I3. (Meta)data include qualified references to other (meta)data.

For Reuse:

R1. (Meta)data are richly described with a plurality of accurate and relevant attributes: they are released with a clear and accessible data usage license (R1.1), associated with detailed provenance (R1.2), they meet domain-relevant community standards (R1.3).

These rules are fundamental for the implementation of FAIR data management principles.

1.4. A (measurable) vision for the Mediterranean Sea

Knowledge Management is an evolving domain also in reason of even more rapid technological changes. While some principles apply globally, any strategy must be contextualized it in its geographical and geopolitical framework. In this regard, the Mediterranean Sea represents a unique example of diversity (biological, social and cultural) and a perfect lab for Knowledge Management Strategy application. Precisely, at environmental level, its configuration as a semi enclosed basin makes it more sensitive to any environmental change and a sentinel for new and upcoming environmental challenges. Since the Barcelona Convention brings together Contracting Parties with different experience and background in data handling, the process of agreement on data practices and workflow results in a perfect mix of technical and mediation work.

Given these considerations, the Strategy must be conceived as a living document, subject to periodic updates - ideally every 4 years - as new and emerging technological trends rise. Also, its implementation should be subjected to continuous adjustments to adapt to local, regional and global necessities. In brief, the Strategy and its implementation tools (the Data Policy and the Knowledge Management Platform) should be tailored to the Contracting Parties needs and capacities, ensuring that the Strategy remains practical, relevant and impactful as a reference point for the Mediterranean Sea.

To this purpose, monitoring the application of the Strategy is a fundamental step. The Strategy in particular is embodied in two tools: the UNEP-MAP Data Policy and the Knowledge Management Platform. It should be of interest the monitoring of the tools with respect to two main factors: how much the tool is requested (outreach capacity), and how much it is correctly used (compliance with principles). Both these two aspects in fact underly a set of best practices that concretise in the shape of the implementation instrument itself, for example outreach capacity is almost always driven by usability of the tool, and this underlies basically clearness, and accord with common practices consolidated among contracting parties and international community. On the other hand, compliance with principles could be easily verified since FAIR data management principles are, by nature, measurable.

2. Digital transformation leveraging Knowledge Management across UNEP-MAP

While technological changes rapidly arise, a digital transformation process that adopts the last and more performant technologies in different fields of Knowledge Management allows for a faster, efficient, and user-friendly knowledge dissemination inward and outward UNEP-MAP.

The main objectives to be accomplished within a successful digital transformation are:

- 1. *Re-define digital delivery models*: to increase accessibility of information across and outside the MAP.
- 2. Enhance digital co-creation and collaboration models: to improve collaboration methods.
- 3. *Improve digital partnership, engagement, and advocacy*: supporting communication campaigns and analyzing reactions.
- 4. Unleash knowledge within MAP system: cataloguing, connection and sharing of MAP knowledge.

- 5. Use the power of MAP data: ensure quality, usage, and accessibility of MAP data.
- 6. Leverage digital to increase cost effectiveness: promotion of digital automation actions, selfservice, and other technologies to reach flexibility, scalability, and reuse of technological solutions.

Some actions put in place during in the last years are particularly going in the direction of a "fair application" of the latest available technologies and therefore could be individuated as best practices in a digital transformation context. For example:

- The choice of an infrastructure for the Knowledge Management Platform granting the use of standards for data and metadata dissemination, making the whole instrument interoperable.
- The opening of a Zenodo channel where all the material related to INFO/RAC can be shared with a Digital Object Identifier (DOI), making all the "grey literature" (presentations, videos, information documents, reports) easily available for anyone.
- The opening of a GutHub channel, where all the code developed in the frame of INFO/RAC is shared and available for anyone as Open Source code, included KMaP source code.
- The creation of a "Network" section in KMaP linking UNEP-MAP to citizens, stakeholders and scientists by means of collaborative instruments, such as forums, helpdesk, project management tools.

From a broader perspective, the future of digital transformation is no more focused on the shift from analogic to digital information, but on the delivery of results and the rapid, effective dissemination of knowledge. In this context, **digital transformation represents a key concept which is more related to a mindset characterized by proactivity, responsiveness to latest technologies, and efficiency in problem solving while identifying the best technical solution (or composition of technical solutions) to complex problems**. All the actions envisaged in this Strategy need to be intended as framed in this operational framework.

3. Knowledge Management Strategy implementation

While setting the principles of a strategy is fundamental to track the route for future developments on Knowledge Management, it is equally crucial to ensure its implementation. In fact, while principles are commonly sharable and reasonable, the implementation set the difference among one strategy and the other and the instruments used to put in practice principles really make the difference between a successful or a weak strategy. It is therefore important to bear in mind that the main objective of any knowledge management strategy is the dissemination and reuse of knowledge and objective that can be reached through robust, accessible and user-friendly implementing tools.

3.1. Data policy

The UNEP-MAP data policy, adopted in 2021 by Contracting Parties, is an Open Data policy comprehensively documenting principles, legal framework, data flows and roles of different actors involved in the data policy application.

Decision IG.25/10 (UNEP/MED IG.25/27) aims to achieve a base level of cooperation with national and international legislation by means of establishment of principles, objectives and instruments for each data flow in force to UNEP-MAP. Contracting Parties are requested to implement the MAP Data Policy with the support of INFO/RAC.

The data policy defines the quality of involved elements. Crucial qualities deserving to be recalled here are:

- Data should be available at no cost, at the most updated version and in the lesser time than the possible.
- Long term data series should remain available in long term repositories.
- Quality assessment and control procedures should be put in place.

While the undergoing constraints are considered in the respect of intellectual property and the consideration of relevant national legislations, also the type of data concerned is highlighted: aside of Contracting Parties official data, the data policy supports research data stewardship, publication of metadata and the use of crowd-source data such as the ones coming from citizen science actions.

Together with foundational principles already mentioned, the Data Policy recommends a number of pillar actions:

- Avoid data duplication: data should be collected once, managed the nearest where they are collected, and shared multiple times for multiple purposes.
- Avoid duplication of efforts: a mindset shift from data ownership to data stewardship is necessary. Reuse of existing, quality assured data is encouraged as a fair practice.
- **Recognize data as a public good**: UNEP-MAP in all its parts acknowledge its usefulness for everyone, and all the parts will do the possible to put in practice fundamental principles, promote data reuse, leveraging progress.
- Ensure interoperability: the use of internationally recognised standards for data, metadata and infrastructures is mandatory to ensure effective integration and reuse across systems and organizations.

Another pillar of the data policy is the Open Access: data must be as open as possible, respecting the constraints imposed by local legislation, sensitivity of data, and copyrights. This principle should be operationalized through the adoption of Open Data licenses. The Creative Commons Attribution license (CC-BY, <u>https://creativecommons.org/licenses/by/4.0/</u>) is recommended as preferable, while obviously taking into account previously present licenses, and particular restrictions to be applied on data.

Acknowledge data provenance and history is fundamental for data reuse, and this should be done by comprehensively filling up metadata. Also, the use of attributes codified in vocabularies increase data value by making them more understandable for an external user.

The data policy also addresses the management of **sensitive data**, suggesting different handling methods for different situations. In the Mediterranean context, data sensitivity may arise from different considerations: they could be environmentally sensitive, or they could be sensitive for national security reasons or in the sense of GDPR regulation.

While the last two cases imply some restrictions that are well codified in laws and data sharing should respect specific prescriptions, for environmentally sensitive data different approaches could be designed: data could be not shared at all, data could be shared spatially and/or temporally aggregated. In any case if data owner has some specific concerns regarding the sharing of some environmental sensitive data, a consultation with INFO/RAC could be established and the best technical and scientifically valid solution could be adopted.

A general and final recommendation for a correct data policy application is that eventual constraints on data must be verified before taking any measure for data sharing.

3.1.1. Effectiveness indicators

According to the principles outlined in paragraph 1.4, one of the indicators for the Data Policy to measure its level of outreach, is represented by the **number of trainings** delivered per year (dissemination actions) to the Contracting Parties of the Barcelona Convention, stakeholder, inside and outside UNEP-MAP framework. This indicator also includes interventions concerning the Data Policy to conferences and meetings organised by third parties and its value is expected to increase in time for the very first period, then diminish a bit and finally stabilise over a steady value (Figure 2). Taking into account the possible size of the user base, the values indicated as objective are up to 10 delivery per year in the first 5 years and up to 5 delivery per year in the "steady phase" which should be reached reasonably around the 8th year of life of the instrument. Given that the Data Policy has been adopted by UNEP-MAP in 2021, this indicator should reach the peak around 2026. A detailed report about the indicator should be delivered every two years, to promptly implement eventual corrective countermeasures.



Figure 2. The number of given training in time for the Data Policy

3.2. The Knowledge Management Platform

The creation of the UNEP-MAP Knowledge Management Platform represents an ambitious yet strategic initiative. Its main object is to provide a unique access hub to the extensive body of the UNEP-MAP knowledge heritage and encompasses some clear steps to be done, anchored on the Knowledge Management Strategy principles implementation. In particular, the recognition of data as a public good, together with the application of efficient data management principles, are a successful combination to reach the expected output which are:

- Raising public awareness.
- Provide decision makers with handy instruments to parse and interpret data.
- Enhance the knowledge transfer from academia to the civil society by creating a link among science and policy.
- Create interoperable tools, for example by using Web Map Services and Web Feature Services standards for geographical information, to make available institutional data to scientists in co-creation contexts.

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UNEP-MAP Knowledge Management Platform (KMaP, <u>https://kmap.info-rac.org/#/</u>) concretise all of these objectives in a visually appealing and user-friendly interface (Figure 3). It is shaped over three instances:

- **Data Hub**, accessible through the "MAPS" button from the homepage collecting all the geographical or geo-related resources of UNEP-MAP.
- Knowledge Hub, accessible through the "DOCUMENT" button, that collects UNEP-MAP documental assets.
- **Knowledge Exchange Hub**, represented by the button "NETWORK" in the homepage, this space houses some user-specific instruments to raise awareness on UNEP-MAP works and searching for collaborations, that will be delivered in December 2025.



Figure 3. The homepage of KMaP.

The entire infrastructure is built on Open Source instruments such as Geoserver and GeoNode which enable the sharing of geographical data and documents with internationally recognised standards. Compliance to these standards is measured during the metadata entry process, so the compliance could be verified "live" by the user while uploading data.

As part of the preparatory activities which led to KMaP, the MAP Data management Task force accomplished a first and fundamental discovery of data. The process involved the identification of structured and non-structured data, qualification and quantification of the datasets and improvement documentation of data by adding metadata, where they were not present, or enriching them where required from the metadata standard adopted.

Another fundamental preparatory phase for the implementation represented the user requirements individuation and the definition of access levels to the platform and a logic behind the platform navigation. To this purpose, potential users have been identified, their potential interests have been depicted, and some use cases have been selected. Multiple access levels and permissions (Figure 4) have been defined to allow different users to perform different actions on the platform.

Finally, a survey based on a set of use cases has been put in place to test the effectiveness of the platform's structure.

	User	Is registered?	Can Upload?	Can Edit/Delete?	Can View?	Can Download?	Can Set Privileges?
Contracting Parti	ies CP	Yes		Yes, their data	Yes. Public and restricted material (following sharing regulations)	Yes. Public and restricted material (following sharing regulations)	No
	MAP CU and RACs (except INFO/R AC)	Yes		Yes, their data	Yes. Public and restricted material (following sharing regulations)	Yes. Public and restricted material (following sharing regulations)	No
MAP component	s INFO/RAC	Yes	Yes	Yes, all the material on platform	Yes, all the material on platform	Yes, all the material on platform	Yes
MAP partners	Stakeholders a nd researchers	Yes	No	No	Yes, Public and restricted material (following sharing regulations)	Yes, Public and restricted material (following sharing regulations)	No
Other users	Anonymous	No	No	No	Yes, only public material	Yes, only public material	No

Figure 4. Access levels for different users of the KMaP.

The KMaP offers a range of products such as:

- Layers and maps: shared via the Data Hub, a layer is a single dataset while a map is a superimposition of layers resulting in a combination of datasets, with a specific communication aim.
- Geostories and Dashboards: shared via the Data Hub, *geostories* are powerful divulgation instruments that combine text, interactive maps, and other multimedia content like images and video or other third-party contents; *dashboards* provide charts, maps, tables, texts and counters attached to datasets with the aim to visualize specific data in context, interact spatially and analytically with the data by creating connections between widgets, perform a first analysis on involved data/layers.
- **Documents**: shared via the Knowledge Hub, the library implements a full text search functionality able to retrieve documents also based on their contents. All the documents have been linked to their sources, not harvested, where sources are RAC's libraries, UNEP and UNEP-MAP libraries accounting for about 20000 documents. Also, each resource can be linked to other resources, i.e. other language versions of the same document, documents from the same meeting, documents and data from the same project.
- **Remote services**: via the Data Hub, KMaP links numerous remote layers from other portals and, conversely, KMaP public geographic data is available to be shared by means of remote services working with OGC standards WMS and WFS. In this way other portals/platforms, but also desktop GIS, can exploit UNEP-MAP data

The potentials of KMaP open a range of wide possibilities for its use. In fact, it has been extensively used and tested while making available data and metadata for the preparation of the last **Mediterranean Quality Status Report** (MED-QSR, <u>https://medqsr2023.info-rac.org/</u>). Another ongoing application of KMaP is as a viewer for **IMAP geographical data**: the services provided consist in a routine automatically linking and publishing (on a KMaP map) already public IMAP data.

Finally, KMaP is also available as a data/information sharing platform for international agreements that do not have the resources or data volumes to support their own dedicated platform. This is the case of Pelagos Agreement (<u>https://pelagos-sanctuary.org/it/accordo-pelagos/</u>), with whom INFO/RAC signed a Memorandum of Understanding designating KMaP as the platform to share outcomes from the project, and the North Western Mediterranean Particularly Sensitive Sea Area, whose data working group includes INFO/RAC itself (PSSA, <u>https://www.oceancare.org/en/stories_and_news/imo-pssa/</u>).

Potential and future uses, in addition to already in place ones, encompass the creation of maps (intended as interactive and queryable superimposition of layers) for their integration in websites, the creation of dashboards and geostories to be embedded in partners' websites, the use of the new project management

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tool for UNEP-MAP partners for projects dealing also with KMaP data and documents, the use of the upcoming Jupyter lab instance for scientists or stakeholders dealing with KMaP data at a higher level.

Finally, the design of the platform also plays a crucial role in the efficacy of these actions. With the objective of reaching the broadest possible audience, including citizens, policy makers, stakeholders, community of interests or scientists, the platform architecture has been built around users' needs, taking into account user experience while designing it, and the navigation logic is reflected in the architecture.

3.2.1. Effectiveness indicators

In line with the principles outlined in paragraph 1.4, also for the KMaP one of the adopted indices is the outreach index, defined as the **number of dissemination activities** of the platform delivered per year to the Contracting Parties of the Barcelona Convention, stakeholder, inside and outside UNEP-MAP framework. The trend of this indicator is expected to follow a similar path as the one defined for the Data Policy, but given the continuous updates of the Platform, the index value in the "steady phase" is supposed to be sensibly higher than the one for the Data Policy (up to 7). Moreover, given the attractive nature of the Platform, the peak for this indicator is supposed to be reached earlier than 5 years from its launch, around the 3rd year of life (Figure 5). Given that the launch of KMaP prototype occurred in 2023, also this indicator should reach the peak around 2026.



Figure 5. The number of dissemination activities in time for the KMaP

Another relevant metric to assess the internal outreach of the KMaP, is the number of layers and documents added yearly since the launch of the platform. Due to the different reasons for which the platform could be used, it is not possible, in this case, to establish an "a priori" trend for the indicator. However, given the variety of purposes for which the platform has been designed, and always considered the size of the user base (composed by CPs, stakeholders, citizens and researchers), the **number of new items** index is classified as:

- **Sufficient** if greater than 20
- **Good** if greater than 50
- **Optimum** if greater than 70.

A further key indicator, evidencing the compliance with the Strategy principles, is the **number of remote services** made available via the KMaP. Given that: (i) geographical data for which remote services can be actually established represent only a part of the items shared via the platform, (ii) many geographical layers present on the platform are represented by remote services from other providers, and (iii) only data classified as "public" can be shared via remote services, the objective for this indicator is fixed to about 10 per year.

Another fundamental indicator aligned with of the Strategy principles across the KMaP is the **completeness of metadata** associated to data present on the platform. To this purpose, KMaP applies the ISO19115 metadata standard to geographical data to evidence which fields are mandatory or not and the completeness of these is also highlighted while drafting metadata. The same occurs while drafting metadata of documents which also follows Dublin Core standards. Given some physiological lack of information regarding data (data could be badly documented at the source, information could be no longer available or rather don't exist), the objective for the metadata indicator is graded as follows:

- Sufficient if overall completeness of metadata is greater than 50%
- Good if overall completeness of metadata is greater than 70%
- **Optimum** if overall completeness of metadata is greater than 90%

A comprehensive indicator report should be produced every two years, to promptly implement eventual corrective countermeasures.

3.3. Risk assessment and responses

The risks concerning the application of the present strategy is strictly tied to the successfulness of their implementing tools. Hence, risks related to the strategy are coincident with risks deriving from: (i) the wrong application of the data policy, or (ii) the misuse or scarce use of the KMaP. A comprehensive risk assessment analysis on the implementing tools of the strategy should be carried out in a specific report with the use of appropriate instruments (such as SWOT analysis) each 2 years. Detailed countermeasures should be identified.

3.3.1. Wrong application of the data policy

Even if the UNEP-MAP data policy is a soft regulation, the consequences of a wrong application of the tool could be concrete. This happens basically because the matter of the data policy (i.e. data) are often regulated by national and international laws.

Given that most of the occurrences could be related to the **wrong acknowledgement of data source** or coming from **not respecting the right license**, it could also happen (more rarely) to **inadvertently share sensitive data**, and the consequences from one case to the other differ considerably in reason of the type of data shared and the implications of sharing action. The meticulous respect of the data policy prescriptions is hence of primary importance while sharing knowledge.

Some general responses can be depicted here for the most frequent cases of wrong data policy application:

• <u>Attribution errors:</u> Wrong or missing acknowledgement of the data source is the typical case is that data owner/manager is not named in the metadata. As a response to this possibility, preventive measures consist in always acknowledge the data owner/manager deep diving in all the information available for the data, until at least mandatory fields for the metadata standard are filled. The filling of mandatory metadata ensures that the data provider respects all

the prescriptions about data ownership and acknowledgement. A "a posteriori" response to the missing or wrong acknowledgement of data ownership requires the data to be temporarily retired from sharing, corrected in all the relevant metadata fields and then re-shared again. This process could require time (in searching information about the specific dataset, basically), but depending on the license data has, if not pursued, could lead to consequences on the data provider.

- <u>License issues</u>: In the case of wrong or missing license, while the preventive measure is always to search for all the information available for data "a priori", "a posteriori", if the license is wrong (the error has been identified) it is important to promptly correct the metadata. In the case the license is missing it is crucial to diligently investigate if a license really doesn't exist, **also considering the case of Public Domain (PD) waivers**: in this specific case, in fact, a proper license doesn't exist, but data should be in any case left in PD for ethical reasons, respecting owner's original will. In the case of missing license, data could be shared respecting data policy prescriptions indicating "unknown" as license in the metadata and specifying in the metadata that the license is unknown at the date and time of the sharing action.
- Sensitive data exposure: In the case sensitive data has been inadvertently shared, if the error is recognised, data should be immediately retired from sharing, and all the possible countermeasures should be taken. In the case of environmental sensitive data, together with data owner a solution could be studied to share aggregated data (spatio/temporal aggregation) that allows data to do not be sensitive anymore. An example is the monk seal sightings: in this way even if data holds location information (coordinates), it could be aggregated by generalizing position (e.g. regional scale) to preserve the specie. In the case data is classified as sensitive because personal information is contained in it, it should be defined which type of sensitive information is reported. In case "simple" personal data are reported, the individuals involved could be asked to sign an agreement to share this information (name, surname, email etc.). If the agreement is signed then the sensitive data could be shared, if the agreement is not signed then the data should be or retired entirely or anonymized. Also considering that personal information should be retained from the data provider the exact time necessary to match the fixed objectives, and after that time they should be destroyed. If sensitive data are data referred to medical conditions referred to an individual or legal trial, if they are public, they can be shared without any issue. In the case they are not public, data should be retired immediately.

3.3.2. Misuse or scarce use of the KMaP

Often, very powerful and technological advanced instruments such as Knowledge Platforms are delivered and fails due to the lack of understanding of the potentials of the tool.

This is maybe the most frequent case of "failure" of a Knowledge Management project because technological implementation and communication campaign are not aligned. To make the strategy effective a structured communication campaign, encompassing a proper analysis of the recipient of the product (in this case the KMaP) and focused actions, should be put in place. Moreover, these actions should not represent "spot" actions, expression of the temporary need, but they should be framed in a big picture identifying, together with the expected outcomes of the single action, the long-term objectives UNEP-MAP aims to reach with the entire campaign. A coherent and continuous communication campaign is crucial for the successful application of the strategy in these cases, and it should be aligned with the broader UNEP-MAP communication strategy approved by Contracting Parties in 2021, and specifically the Communication as One approach.

Give that the KMaP is conceived as a space of co-creation for all the MAP partners, Contracting Parties and eventual stakeholders, in principle **no use can be labelled as inappropriate use** if responding to specific user necessity. However, there is still a risk of misuse of the resources inside the KMaP, that basically happens when data and/or information contained in the platform are used for some scopes which are not the original ones intended. To address this, INFO/RAC has developed a Non-Disclosure

Agreement (NDA) template to be used not only within KMaP, but also for all the other data flows UNEP-MAP manages. Thanks to this powerful instrument UNEP-MAP is able to protect its own rights over data and instruments to view/parse/share them, and eventual collaborators are aware of their rights and duties since the beginning of the cooperation.

3.4. Timeline

Given that the Knowledge Management Strategy is a "living document", continuously adapting to the necessities of CPs and MAP partners, the Strategy will be updated every 4 years. Upon adoption the Strategy will be adopted to allow a prompt supervision on the implementing tools and their usage/development.

So, the delivery of relevant documents is foreseen as per the Gantt diagram reported in Figure 6.



Figure 6. Delivery of relevant documents for KMS implementation

4. Ongoing and future cooperation activities

InforMEA is the portal to access information on multilateral agreements in the environmental field implemented by United Nations. Contents in this platform are accessible by thematic subdivision and by geographical areas. In addition to agreements, policies and technical contents, InforMEA portal hosts local reports and legislation filtered by geographic area.

UNEP-MAP KMS is actively working in synergy with **InforMEA**, and to this purpose, a collaboration action has recently been launched with the aims to: (i) integrate into the Knowledge Hub of the KMaP the available documentation related to the Barcelona Convention present on InforMEA platofrm, (ii) update InfoMEA e-learning course on UNEP-MAP, (iii) explore the possible levels of interaction and interoperability among InforMEA e-learning platform and INFO/RAC Moodle instance. In particular, INFO/RAC Moodle instance is connected to the KMaP through the "Network" part of the platform

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(Knowledge Exchange Hub), that represents an access point for different kind of users to raise awareness on UNEP-MAP works and establish new and fruitful cooperations. In this context InforMEA experience in training is essential.

At regional level, the approach conceived for the **MedProgramme** Knowledge Management Strategy served as methodological inspiration for the MAP Strategy. While the MedProgramme is time-bound and project focused, the MAP Strategy has a broader scope and long-term institutional mandate. Synergies with the MedProgramme Knowledge Management Strategy are currently ongoing with different kind of actions. First of all the design of the MAP KMS has been pursued by continuous exchange among UNEP-MAP and MedProgramme Knowledge Management experts, and for the future a fruitful and coordinated cooperation is envisaged since the attention paid by both entities (UNEP-MAP and MedProgramme) is high with a particular accent to be posed not only on the interoperability of instruments adopted (UNEP-MAP and MedProgramme Knowledge Management Platforms) but also on the communication and dissemination part, which involves results and total or partial outputs of the work carried out within the respective Programs of Work.

Another relevant cooperation UNEP-MAP is actively involved in is the consultation and revising process of the UNEP Global Environmental Data Strategy (GEDS). GEDS timeline release has been scheduled as a first draft has been circulated with CPR for review (Mid-March), within April 17 the document is presented to the CPR Subcommittee, after that a second draft will be circulated. An external review, followed by a second CPR review, will be accomplished and the document will be presented in September at ASC-12, and in October for final consideration at UNEA-7. UNEP-MAP involvement was requested since September 2023 with the establishment of a global group of experts in Data and Knowledge Management, aimed to set up a framework for a global UNEP strategy. The group is composed by about 150 members globally representing academia, governments, intergovernmental organizations, non-governmental organizations, and industry. The experts met in Vienna and, during three days of full immersion work, a first draft reporting the key points of the strategy was written. Subsequently consultations started at national and regional level. In particular UNEP-MAP experience is reported as a best practice inside GEDS draft in the standards and interoperability field, documents available about Knowledge Management were requested from UNEP, to support the strategy definition process. The group is supposed to meet again in Rome in July 2025, to discuss and make further observation to the GEDS second draft and UNEP-MAP, together with ISPRA, ESA, and UN-SPBF, is among organizers of the event.

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Annex I Non-Disclosure and Data Sharing Agreement (one way NDA)

Parties' information

Owner:

Name:

Address:

Email/phone:

Alias:

Recipient:

Name:

Address:

Email/phone:

Alias:

Purposes

The present NDA between <u>Owner</u> and <u>Recipient</u> is established upon request from the recipient to share data/information contained in the <u>support, database or platform where data are</u> <u>currently stored and available upon request</u>, in order to accomplish the following obligations:

To this purpose the following material is requested to be included in the present agreement:

Confidential information

With regard to the <u>support, database or platform where data are currently stored and available</u> <u>upon request</u> contents, any data and information not publicly available on the platform are considered "confidential information". Their use is permitted only upon request and subject to a nondisclosure agreement between the parties, whilst respecting specific licenses already insisting on data/information.

No license statement

By signing the agreement, the recipient agrees not to sublicense in any way the confidential information covered by this agreement and the <u>Owner</u> is not communicating the confidential data/information to license it to the recipient. Therefore, the recipient cannot claim ownership rights on any of the data/information.

Recipient's treatment of confidential information

The recipient may only use confidential data/information for purposes approved by the owner. While working with confidential data/information, the recipient can grant access to personnel in its own organization pre-approved by the owner.

The recipient must store original and electronic copies of data/information in its own databases and upon completion of the approved purposes all copies must be destroyed. No hard copy of the data/information is allowed. Printed or electronic images of geographical data should not be considered as "hard copy" of data/information and are thus allowed, except if the document/image is electronically georeferenced (e.g. georeferenced PDFs).

Protective measures

Electronic copies of the confidential data/information cannot be shared with third parties as well as with other individuals which are not included or pre-approved in this agreement. The electronic copies of the confidential data/information should not be stored in a shared working environment, where each employee can retrieve them, but they should be placed in a separate part of the environment where only pre-approved personnel can access.

Clouds or spaces where data/information will be stored will have to benefit from the most advanced technologies against data breach, and these should be communicated to the owner while signing this agreement.

Exceptions

If a third party gets the same data/information through a different medium this does not constitutes a violation of the present NDA. If the confidential data/information object of this agreement is made public from the owner, the present NDA voids automatically. The recipient will not be held liable for NDA breach if the data/information reaches the public through no fault of their own.

Term

Confidential data/information must be kept private without any temporal term from the recipient. If the data/information is disclosed by the owner, then the recipient is allowed to make the data/information public as well.

No assignment

The recipient cannot in any way transfer its obligations (and consequently share confidential data/information with) to a third party.

Date, Place

Signature

_____,_____