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¹ Document will be a draft until it was approved by the coordinator

² PU: Public, PP: Restricted to other programme participants (including the Commission Services), RE: Restricted to a group specified by the consortium (including the Commission Services), CO: Confidential, only for members of the consortium (including the Commission Services)

³ The initials of the revising individual in capital letters

Deliverable D6.3

Visualisation materials and tools available for MR1 development

31/03/2019



Executive Summary

Development of visualisation materials and other visualisation tools that allow stakeholders to easily understand otherwise complicate data on e.g. biological, ecological, economic, social and political issues relevant for the six FarFish case studies is an important component of the FarFish project. These visualisation materials and tools have the purpose of assisting stakeholders within the case studies when developing Management Recommendations (MRs), by showing in a simple manner historic data and forecasts. The forecasts are in particular intended to provide stakeholders with most likely scenarios or effects of MR implementation (what if? scenarios). The visualisation materials and other visualisation tools do also have an important purpose for overall aim of the FarFish project, when it comes to advancing knowledge on fisheries in the case studies, both for internal use within the project and for stakeholders outside of the project.

The FarFish project is run in an iterative process, which amongst other things means that MRs will be developed, tested/validated and audited/valuated twice during the lifetime of the project. The first MRs (MR1) are to be developed and audited in the first half of the project, and these will then be reassessed and improved for a second version (MR2) that is to be completed towards the end of the project. The visualisation materials and other visualisation tools are also expected to go through similar iterative process, where the first versions are intended to assist stakeholders with developing MR1. This deliverable reports on the progress and current status of the visualisation materials and visualisation tools that have been, or are intended to be, made available within the FarFish project to support MR1 development. Some of the visualisation materials and tools discussed in this report are still under design, but are intended to be available for the MR1 development, as the MRs are not due until eight months after the submission of this report.

It is said that “picture is worth a thousand words” and it is important to remember that sometimes visualisation is the only way for successful dissemination of results. The visualisation materials and other tools that will be available for the MR1 development are likely to be "imperfect" given the timing within the project, but will nevertheless provide important input to developing an applicable MR1 alternatives. The tools are likely to consist mainly of static maps and charts, as well as simple GIS.

In this deliverable we list the possible visualisation materials that are and can be available within the FarFish project. Both ideas and concrete examples are listed on the use of visualisation tools for enhanced understanding and better use of the data created within the project.

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Abbreviations & concepts/definitions

CFP	Common Fisheries Policy
FFDB	The FarFish Data Base
GIS	Geographic Information Mapping
MMSI	Maritime Mobile Service Identity
MR	Management Recommendations
MSY	Maximum Sustainable Yield
RFMO	Regional Fisheries Management Organisations
SFPA	Sustainable Fisheries Partnership Agreements
Shiny	A framework for making web-based interactive visualisations

1 Introduction

FarFish aims to provide knowledge, tools and methods to support responsible, sustainable and profitable EU fisheries outside European waters, compatible with MSY. To achieve this, FarFish will develop practical, achievable and cost-effective fisheries management tools and advice which can be applied immediately. The work will be done in collaboration of scientists, policy makers, resource users and other stakeholders aimed to improve fisheries management competences. FarFish will provide a better knowledge base of these fisheries and encourage resource users to actively take part in the management, thus empowering them, generating a sense of ownership and enhancing compliance.

FarFish focuses on six selected case studies, all of which contain fisheries that are important for the fishing fleets of multiple EU countries or respond to the priorities of Regional Fisheries Management Organisations (RFMOs) and the Common Fisheries Policy CFP). In order to increase variability and applicability of the project results, FarFish focuses on two different types of case studies i.e. high-seas fisheries in the southwest Atlantic (FAO area 41) and southeast Atlantic (FAO area 47); and the fisheries under Sustainable Fisheries Partnership Agreements (SFPAs) in Cape Verde, Senegal, Mauritania and Seychelles (see Figure 1).



Figure 1: The six FarFish case studies

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The FarFish project is run in an iterative process, which amongst other things means that MRs will be developed, tested/validated and audited/valuated twice during the lifetime of the project, as shown in Figure 2.

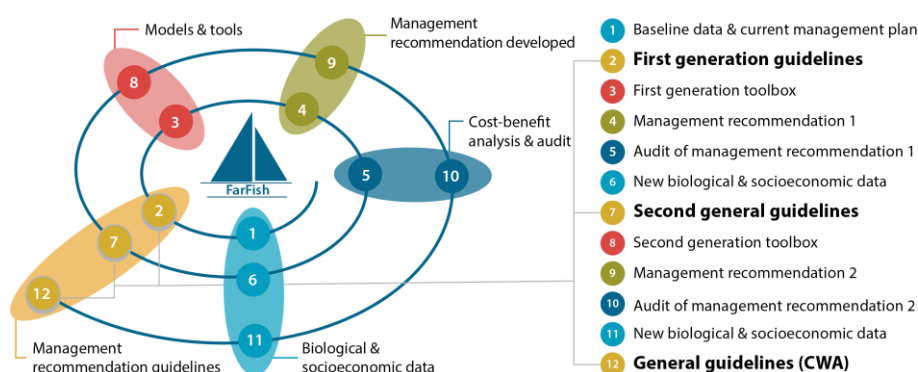


Figure 2: Spiral model in the FarFish project, showing the iterative process within the project

The first MRs (MR1) are to be developed and audited in the first half of the project, and these will then be reassessed and improved for a second version (MR2) that is to be completed towards the end of the project. The visualisation materials and other visualisation tools are also expected to go through similar iterative process, where the first versions are intended to assist stakeholders with developing MR1. This deliverable reports on the progress and current status of the visualisation materials and visualisation tools that have been, or are intended to be, made available within the FarFish project to support MR1 development. Some of the visualisation materials and tools discussed in this report are still under design, but are intended to be available for the MR1 development, as the MRs are not due until eight months after the submission of this report.

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2 Visualisation materials

In order to encourage interest and willingness to commit to a positive change, tools for dissemination need to be easy to engaging and easy to understand. It is said that a picture is worth a thousand words so images, static maps and charts, as well as simple geographic information system (GIS) can be extremely valuable within the context of the FarFish project.

At the time that this report is written, the project is still evaluating and gathering information of importance. Several challenges are to be faced and there is still uncertainty on what data can be compiled and used; as well as what will be available for the development of MR1. Despite this uncertainty and the possible risks as described in the project, several ideas are already being explored, as shown in the list below and in Figure 3 and Figure 4.

Possible visualisation being developed and/or explored

- Maps of species distribution of hake (*M.australis* and *M.hubbsi*), squid (*Illex argentintus*) compared to published maps of AIS (Automatic Identification Systems) gaps by vessels in areas (such data can be provided by Global Fishing Watch)
- Simple infographic visualisation of the morphological and meristic differences between the hake stocks in which are to be separate in the Senegal Tuna and Hake Fishery case study
- Data maps (heatmaps) of ports used by EU fleet and other international fleets that are fishing in waters described in FarFish case studies.
- Layer maps showing, for example
 - o Flag of fleet fishing – EU/others
 - o Which species are caught according to collected data
 - o Ports used by EU/other fleets
- Map showing number of trainees reached by FarFish in total and by region/location
 - o Inspector trainees
 - o Research trainees
- Layer maps showing where management tools have been created through FarFish
 - o Biomass measurement and/or management in place
 - o Control and monitoring in place
- Maps showing where an increase in collected/compiled data has taken place through FarFish
- Map showing where there are active SFPA between EU and coastal communities (and between other countries and coastal communities)
- Using an Rstudio shiny instance that has been installed for use in FarFish. Shiny is a framework for making web-based interactive visualisations using R.
- Using data from the FarFish DataBase (FFDB).
 - o FarFish will compile biological and ecological data for the relevant stocks in each case studies and make them publicly available, whenever possible, in a database (FFDB) accessible on the FarFish web page. The FFDB will focus on compiling available biological and fisheries data; information on the biology, life history parameters and ecology of key species, their distributions, migrations, stock sizes and interactions within the ecosystem. Fisheries dependent and independent data, including catch and effort, by-catch and discards and gear selectivity will be obtained, with special focus on historical time series and unpublished or grey literature such as research cruise surveys. Existing sources of data include case study national research institutes, RFMOs

and international initiatives. Catches will be analysed by species, fleet type and landing harbour. The data collected will feed into the FFDB, which will then feed into models and management tools that will provide better understanding of biology and ecology of the respective species and ecosystems. **The data collected will also be used for making visualisation materials.**

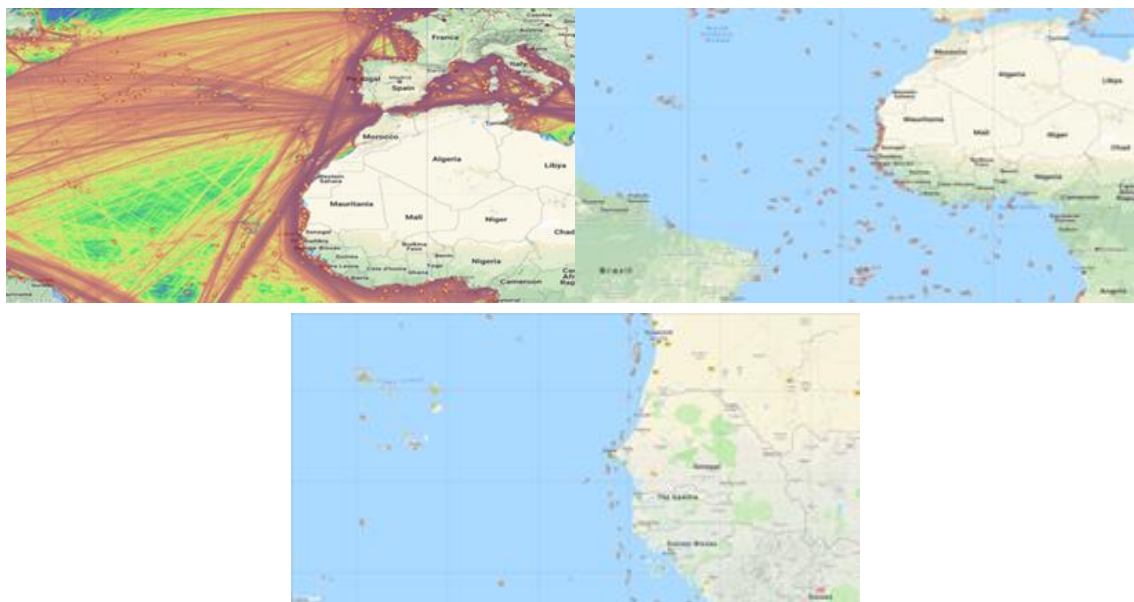


Figure 3: Examples of maps that can be created for visualisation (screenshots borrowed from www.marinetraffic.com)



Figure 4: Example of maps that can be created for visualisation (screenshots from the FarFish DataBase / <https://ffdb.farfish.eu/upload>)

Additionally, most data mentioned in this list can be compiled into layered maps, giving the user easy access to important data/information.

FarFish aims at collecting important biological, environmental, economic and social data, that can be used in the list of possible visualisation items above, that is relevant for the SFPAs and the EU fisheries in international waters. Additionally, important data can be collected through databases such as

Marine Traffic (www.marinetraffic.com) and Global Fishing Watch (www.globalfishingwatch.org/) and used in conjunction with data collected/compiled in the project. This way, light can be shed on important facts/data, or even lack of data, relating to fisheries in the areas discussed in FarFish.

There are as well other sources of data and visualisation that will be considered, as there are already numerous ongoing initiatives that provide visualisation or other tools that are relevant for the FarFish project. Among those are for example the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which is the intergovernmental body which assesses the state of biodiversity and of the ecosystem services it provides to society, in response to requests from decision makers.

3 Visualisation tools

A demo version of a visualisation tool has already been developed, It can be found at www.matis.tech. In the map the user can move his mouse pointer to any point that indicates a vessel and information relevant for the selected vessel(s) will then be displayed i.e. fishing hours, flag, gear type, length, tonnage, engine power and MMSI.



Figure 5: Examples of layered maps (heat map and fishing hours) that have been created for visualisation (screenshots from www.matis.tech).

Further development of this tool and others will continue as the project progresses.

4 Workplan for development of visualisation materials and tools

Work on developing visualisation materials and visualisation tools is intended to be ongoing all through the FarFish project. This work is however only intended to be reported on in two specific reports i.e. D6.3 “Visualisation materials and tools available for MR1 development” (this report) that is due in month 12 of the FarFish project; and D6.6 “Visualisation materials and tools available for MR2 development” that is due in month 26. A draft workplan has therefore been made that is to guarantee that the tasks progresses as planned. Table 1 shows important dates for this workplan.

Below is a timeline showing important dates for the development of visualisation material:

Table 1: Workplan for development of visualisation materials and tools

December 2018	- Maps and other visualisation tools to support D4.3
April 2019	- Maps and other visualisation tools to support D5.1.
July 2019	<ul style="list-style-type: none"> - Visualisation materials with D2.6, Report on biological and ecological data in FFDB pilot version 2. - D6.6 - Visualisation materials and tools available for MF2 development.
April 202	- Maps and other visualisation tools to support D4.4
July 2020	- Visualisation for each CS (maps and other visualisation tools) with D4.4.
April 2021	- Maps and other visualisation tolls to support D7.12 and D7.13

This workplan is only to provide indications on when concrete input that include visualisation materials and tools are expected. This is however a task that is expected to be ongoing throughout the project and project partners, such as case study leaders and WP leaders, can always request for visualisation to be developed; as the visualisation team within the project is to be available to provide services upon request.

5 Conclusions and discussions

The objective of FarFish is to improve knowledge on and management of EU fisheries outside Europe, while contributing to sustainability and long-term profitability. 21% of EU catches originate from non-EU waters. These fisheries are often poorly regulated, management decisions are sometimes based on limited knowledge and enforcement capabilities, compliance and trust between stakeholders tend to lack.

The FarFish project is designed around six case study areas in which the European operators are actively engaged in fishing activities, including Cape Verde, Mauritania, Senegal and Seychelles, as well as the international seas in the southeast and southwest Atlantic. In this context of geographic, economic and cultural diversity, the project will gain insights into the sustainability of commercially important species such as tuna, hake, mackerel, sardines, octopus, shrimp, and other relevant fisheries. Visualisation materials, and other tools, that can assist operators and other stakeholders in developing MRs, are an important part of each case study in the FarFish project, as well as for the outcome of the project. The visualisation tools will give information on important biological, ecological, economic, political and social issues that can be relevant for the MR1 development and give information on potential effects of MR implementation (what if? scenarios). For the project to be successful, as with any project of relevance, it is of utter importance to make sure that complex issues and concepts are broken down for additional understanding. This will lay the path for increased stakeholder involvement and will provide additional tools so that the co-creation is successful.

The visualisation materials and tools presented in this document represent only an initial identification and preliminary versions. The project is still evaluating and gathering information of importance which will identify additional needs for visualisation tools or materials. There are several challenges to be faced and there is still uncertainty on what data can be compiled and used in this respect.

It is often said that a picture is worth a thousand word and that is certainly true for the success of the case studies in FarFish and the project as a whole.