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FPCUP Action 2021-2-47: Report on the second cycle of interaction with national users.

INTRODUCTION

IHCantabria recognizes the value of Copernicus services and downstream products, as well as the need to promote their use. Within this framework, IHCantabria actively engages in multiple FPCUP initiatives (2021-2-33, 2021-2-42, and 2021-2-47) to underscore the value of these products.

Regarding Action 2021-2-47 “Coastal coordination of user needs and methodologies”, planning includes two types of activities:

1. Interfacing with national coastal users' groups
2. Definition of a methodology to analyse, integrate and prioritize users' needs

These activities are being developed over three cycles of stakeholder interactions. During the first cycle, a survey was conducted to identify the gaps and needs of the Spanish coastal stakeholders and how Copernicus products can address these gaps. To do so, relevant coastal stakeholders were recognized within four different marine sectors: Species conservation and protected areas, Coastal protection, Ports and harbours and Maritime transport. On the other hand, all the partners started to work on developing a common methodology for all countries to collect information on stakeholder needs and interests.

In the current second interaction cycle, all the partners agree to test the methodology developed for the user needs analysis with the same group of stakeholders, the aquaculture sector. Each partner tested the methodology in its own country in order to analyse the comparability of results. Thus, IHCantabria launched a second survey to address the needs and requirements of aquaculture stakeholders in Spain.

Once the survey methodology had been tested, each partner decided how to apply the survey results in each of their respective countries. In this sense, IHCantabria decided to propose a “Living lab” to the public administration in charge of aquaculture management, in order to show the main products demanded by the sector.

Following the proposal's work plan, the results of the second cycle are detailed below.

RESULTS FOR SECOND CYCLE OF INTERACTION WITH NATIONAL USERS

As a starting point, the general stakeholders' database created during the first cycle of interactions has been updated. A more thorough and detailed search for stakeholders was carried out, focusing on the aquaculture sector. A total of 100 new contacts were identified, bringing the total number of entries in the database to around 300.

To interact with all these stakeholders and test the mentioned methodology, IHCantabria developed an online survey aimed at engaging them, gathering insights into their familiarity with Copernicus data and products. The survey examined the different needs and gaps within the aquaculture sector

in the development of its activities. The survey also tried to identify information on existing services and products related to aquaculture.

Annex 1 shows the breakdown with the questions from the survey conducted in Spain.

Results of the survey

Approximately 9% of the contacted stakeholders participated in the survey. Therefore, the survey received a total number of 26 responses, encompassing a total of 23 entities which represents all sectors identified in the methodology: Institutional (46%), Research (35%), Academia (15%), Private commercial (12%), Private non-commercial (8%) and other (8%). It seems important to note that in the first cycle of interactions, the profile of the participating organisations followed a similar distribution to that of this second survey, with a higher representation also of research and institutional organisations. However, in this second survey, the participation of private companies, which was missing in the results of the first cycle, was achieved.

Regarding the results of the survey, the aquaculture users' needs were analysed from two different perspectives. The first one related to the most important elements, for which it is a priority to obtain information for the development of its activities. In this sense, the greatest need for data is in relation to bathymetric information, the suitability of the species and the current distribution of the farms (Figure 1).

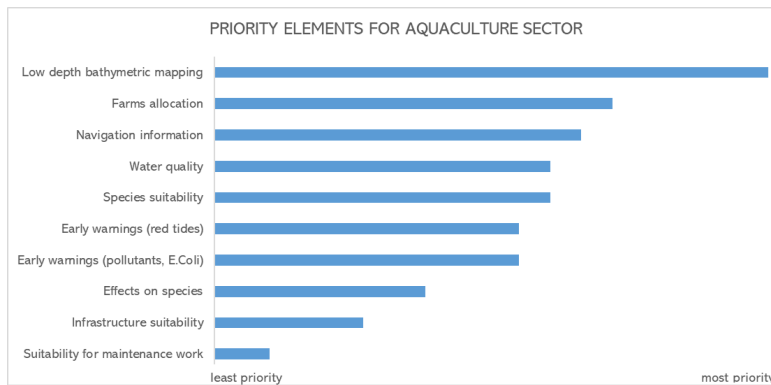


Figure 1. Priority elements for information gathering in the development of aquaculture activities

The second one referred to the need of different spatial and temporal resolutions related with certain categorized parameters (Figure 2).

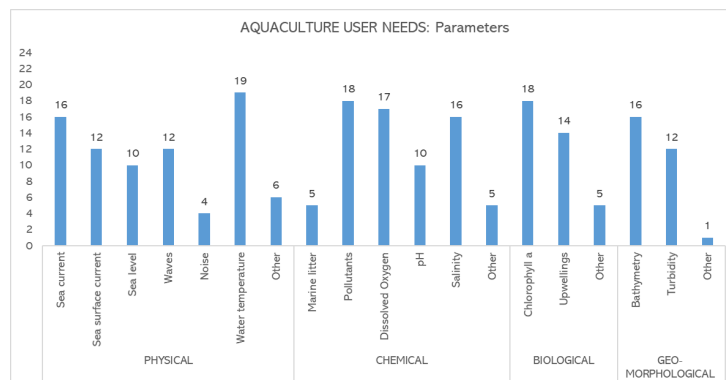


Figure 2. Aquaculture stakeholder needs regarding different parameters categories (physical, chemical, biological and geo-morphological)

In terms of spatial resolution needs (Figure 3), stakeholders prioritized the requirement for mediums resolutions ranging between 5-250 meters (local studies) and between 250m- 1Km (regional studies). When the question refers to the temporal resolution, the need for information over long periods of time seems to be evident. Thus, stakeholders expressed higher need for long term historical data series (years) and for short term forecast (day-week) (Figure 3).

When analysing the different parameters categories within the physical parameters, there is a higher need of data related with “Water temperature” and “Sea current”. Concerning chemical parameters, data requirements are connected with the categories “Pollutants”, “Dissolved Oxygen” and “Salinity”. For the biological parameters, priority is given to data in the framework of “Chlorophyll a” and “Upwellings”. And finally, for the geo-morphological parameters, data higher priority is given to “Bathymetry” (which we recall was the top priority for respondents) and “Turbidity”.



Figure 3. Aquaculture stakeholders' needs regarding different parameters (physical, chemical, biological and geo-morphological) in terms of spatial resolution and temporal extent

The survey also revealed that 45% of respondents incorporate Copernicus Data in their work. This information is consistent with those obtained in the first cycle when all the different sectors (conservation, ports, coastal protection and maritime transport) were consulted.

For those stakeholders who declared using Copernicus data, the frequency of usage and type of data used were further inquired (Figure 4). The analysis indicates a different frequency of utilisation of Copernicus data between the different aquaculture stakeholders. The 50% indicated that they use Copernicus data on an annual basis, while 40% use it only on a monthly basis. In all cases, Satellite-derived products and Model-derived products support the activities of most aquaculture stakeholders. As with the previous question, these results show the same trend as those obtained in the survey on interactions launched during the first cycle.

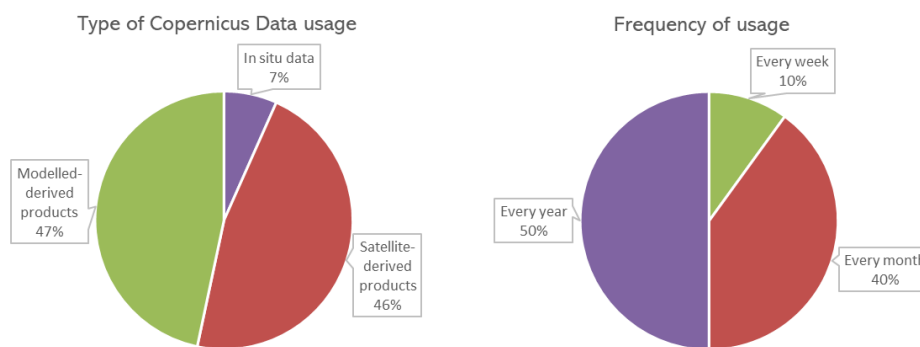


Figure 4. Aquaculture stakeholders' that declared using Copernicus data: periodicity of usage and type of data used.

Further analysis was made to identify the main reasons why stakeholders do not use Copernicus data more frequently. The majority of them stated that the main reasons were the lack of staff or time to do it (60%) and the lack of knowledge or skills to use it (40%).

For the stakeholders that declared not using Copernicus at all, 75% said that the main reason for it was a lack of knowledge or skills to use the data, while 33% declared did not have enough human resources or time to do so.

It is important to note that this does not mean that the data is not interesting or functional, but simply that stakeholders do not have the time or knowledge to make use of these resources. Against this background, one of the priorities for promoting the use of Copernicus data seems to be the training of final stakeholders. It will also be necessary for this training to be direct and agile in order to encourage the stakeholder participation. Moreover, the second priority would be the development of activities or events to raise user awareness about the Copernicus service and all the products it offers.

The final section of the survey focused on collecting details on the use of national services. In this sense, stakeholders indicated that they obtain data mainly from national and regional administrations, but other research databases are also mentioned (i.e. EMODnet, IHData or GBIF).

Proposal of a living lab

Once the results of the survey had been analysed, the design of the Living Lab was developed, taking into account the main needs of the sector, but also the nature of the end users.

When analysed aquaculture stakeholder needs regarding the **priority elements** for which the aquaculture sector needs information, the 11 most demanded ones by users are the following, ordered from most to least mentioned:

- Water temperature
- Pollutants
- Chlorophyll a
- Dissolved Oxygen
- Sea current
- Salinity
- Bathymetry
- Upwellings
- Sea surface current
- Waves
- Turbidity

It is important to note that most of them are directly obtained from remote sensing. Only a few, such as Early warnings (i.e. pollutants), are parameters that need to be modelled. Therefore, the Living Lab should display the results of these parameters directly quantified by remote sensing, thus reducing the uncertainty of the data.

Users don't use Copernicus data in their daily work due to the lack of knowledge or skills to use them. When analysing the users who declare to use Copernicus data in the development of their activities, most of them declare to be basic users with a low frequency of use, mainly once a year. In addition, they indicate that the main reason for not using it more often is the lack of skills to use it and the lack of personnel to learn its use and management. Therefore, as mentioned above, the Living Lab should provide information in a simple and accessible way.

Lastly, the majority of users in the aquaculture sector obtain data for the development of their activities from administrative services. Therefore, this living lab should preferably be hosted on a public administration website. This website could, in turn, integrate data from other information sources mentioned by the users.

With all the collected information, it is evident that users in the aquaculture sector have a need for data to develop their activities. It is also noted that, although a large number of users utilize data from Copernicus, they do so infrequently. Moreover, being basic users, they often have difficulties obtaining the desired information due to the complexity involved in extracting the needed data. Therefore, users resort to a wide range of services or information sources to obtain the necessary data, mainly offered by public Administration.

To address all these aspects, it is proposed to develop a map viewer that integrates all the aforementioned information. It should be an easily accessible and user-friendly mapping viewer, allowing basic users to quickly access the information and data they stated needed (Water temperature, Pollutants, Chl a...etc.).

This map viewer could be incorporated on public Administration websites-platforms, with which the user is already familiar to in their data research.

[Other results. Suggestions for methodology review](#)

Once the methodology to analyse, integrate and prioritize users' needs has been tested, it is proposed to modify the limits established for the analysis of the spatial resolution. Therefore, it is proposed to use these new limits (proposed changes in bold):

- Local studies ($\geq 50\text{m}$ -**300m**)
- Regional studies (\geq **300m-1,2Km**)
- Basin level (\geq **1,2Km-5Km**)

By modifying these ranges, we achieve that the one referring to regional studies covers exactly the spectrum of spatial data provided by Sentinel-3.

On the other hand, the terms to which the acronyms in Table 1 of the methodology refer should also be defined, since for certain non-specialized users, it is not possible to know which term certain acronyms refer to.

[ACKNOELWDGMENT](#)

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ANNEX 1: SURVEY QUESTIONS

Survey

(in bold for internal reading)

GENERAL INFORMATION

1. Personal information
 - a. Entity/Company
 - b. contact name
 - c. Email
 - d. Province
 - e. Entity type
 - i. Academy
 - ii. Investigation
 - iii. Public entity
 - iv. Non-commercial private sector
 - v. Commercial
 - vi. Others (specify)
 - f. What is your relationship/link with the coastal zone? [OPEN]

NEEDS OF THE AQUACULTURE SECTOR

Needs in relation to the activities of greatest interest

2. In the development of your current activities, on which of the following elements is it a priority to obtain information for the development of your activities? (rate from 1 to 5, 1 being the greatest interest)
 - a. Shallow bathymetries
 - b. Location of farms/concessions
 - c. Species suitability
 - d. Infrastructure suitability
 - e. Suitability for maintenance work
 - f. Water quality
 - g. Early warning (contaminants, *E.coli*)
 - h. Early warning (red tides)
 - i. Effects on species
 - j. Navigation information

Needs in relation to data availability and its spatial and temporal resolution

3. In the development of your current activities, what are the parameters on which you need information for the development of your activities? For each of the selected parameters, indicate the optimal spatial and temporal resolution of the data. related

Physical parameters	Spatial resolution	Temporary resolution
Ocean currents	<ul style="list-style-type: none"> > 5Km (nationally) 1Km-5Km (at basin level) 250m- 1Km (regionally) 5-250m (locally) < 5 m (coastal engineering) 	<ul style="list-style-type: none"> Early warning (minutes) Real or almost real time (hours) Short-term forecast (day-week) Long-term projections (month) Long-term historical data series (years)
Surface currents		
Sea level		
Surf		
Noise		
Water temperature		
Others (specify)		

Chemical parameters	Spatial resolution	Temporal resolution
marine litter	<ul style="list-style-type: none"> > 5Km (nationally) 1Km-5Km (at basin level) 250m- 1Km (regionally) 5-250m (locally) < 5 m (coastal engineering) 	<ul style="list-style-type: none"> Early warning (minutes) Real or almost real time (hours) Short-term forecast (day-week) Long-term projections (month) Long-term historical data series (years)
Pollutants		
Dissolved oxygen		
pH		
Salinity		
Others (specify)		

Biological parameters	Spatial resolution	Temporary resolution
Chl a	<ul style="list-style-type: none"> > 5Km (nationally) 1Km-5Km (at basin level) 250m- 1Km (regionally) 5-250m (locally) < 5 m (coastal engineering) 	<ul style="list-style-type: none"> Early warning (minutes) Real or almost real time (hours) Short-term forecast (day-week) Long-term projections (month) Long-term historical data series (years)
Outcrops		
Others (specify)		

Geomorphological parameters	Spatial resolution	Temporary resolution
Bathymetry	<ul style="list-style-type: none"> > 5Km (nationally) 1Km-5Km (at basin level) 250m- 1Km (regionally) 5-250m (locally) < 5 m (coastal engineering) 	<ul style="list-style-type: none"> Early warning (minutes) Real or almost real time (hours) Short-term forecast (day-week) Long-term projections (month) Long-term historical data series (years)
Turbidity		
Others (specify)		

COPERNICUS PROGRAM

Data Access Needs

4. Had you heard of the Copernicus program before?
 - a. Yes
 - b. No

(If the answer to question 5 is Yes, go to the next questions; If the answer to question 5 is No, go to question 11)

5. Do you use Copernicus data in the development of your activities?
 - a. Yes
 - b. No
6. In terms of Copernicus products, you consider yourself a
 - a. Final user
 - b. Service provider
7. Do you consider yourself a basic, intermediate or advanced user of Copernicus data?
 - a. Essential
 - b. Intermediate
 - c. Advanced
8. What type of Copernicus data does it use in carrying out its activities?
 - a. On-site data
 - b. Satellite Products
 - c. Model Derived Products
9. How often do you access the service?
 - a. weekly
 - b. each month
 - c. every year
10. What are the main reasons NOT to use Copernicus data more frequently in the development of your activities?
 - a. I do not have enough knowledge or skills to use them
 - b. I don't have enough staff or time to do it.
 - c. User-unfriendly interface
 - d. I can't find the spatial resolution I need
 - e. I can't find the temporal resolution I need
 - f. Difficulty downloading data
 - g. Difficulty in subsequent data manipulation (extraction, formatting...etc.)
 - h. Incomplete metadata information
 - i. I can't find the data I need

(If the answer to question 5 is Yes, go to the next questions; If the answer to question 5 is No, go to question 11)

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11. If not, what do you think are the reasons for not using this service?
- I do not have enough knowledge or skills to use them
 - I don't have enough staff or time to do it.
 - It is not relevant to the development of my activities
 - I was unaware of its existence
 - Others (specify) [OPEN]

SERVICES AND PRODUCTS

12. List the national services from which you obtain data for the development of your activities [OPEN]
13. List, if you know, any Copernicus products from which you obtain data for the development of your activities [OPEN]
14. List, if you know, any use case (“use case”) related to the aquaculture sector that uses Copernicus data in its development [OPEN]