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MARINE SABRES

MARBEFES

# Marine SABRES WP2

## Deliverable 2.1:

## Simple SES design brief

# MARBEFES WP1

*First Part of*

## Deliverable 1.2:

## Stakeholders' recommendations regarding harmonization and integration of social-ecological frameworks

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**As an Annex to this study in Appendix 12 additional Marine SABRES surveys in the Arctic are reported under the responsibility of the authors of that Annex**

## DISCLAIMER

## Contents

## Summary

In the two EU Horizon Europe projects Marine SABRES and MARBEFES a series of stakeholder interviews and surveys were held along the coastline of islands in the Atlantic Ocean and along the coastline of Europe. In total 231 stakeholders were consulted in 15 research areas, distributed in 5 major regions (Macaronesia, Mediterranean, Atlantic Coast, Baltic, Arctic). The stakeholders belonged to 4 major categories, i.e., the public at large (Public Audience), governance and policy (Public Authorities), commercial business (Industry & Private sector), and scientists (Academia & Research).

The stakeholders were asked to indicate, on behalf of their professional sector, and according their viewpoint, what the most important elements are in the balance between the ecology, economy and society in their coastal zone, and what the strongest pressures are on this balance.
The aim, explained to the stakeholders, was to help composing a simple stakeholder supported management and decision support tool in order to reach a (more) sustainable balance between the biodiversity, ecology, economy and society of the coastal zone they were living or working in.

In the interview the stakeholders were free to indicate whatever element they thought was important. After harmonisation of the keywords they expressed, 92 elements were brought forward in total. The stakeholders were also asked to indicate which elements were influencing each other and to indicate the strength these elements were influencing each other in a negative or positive way with a strength between -5 to +5..
In the surveys, the stakeholders were given preformulated elements on cards to which they could give an importance score following a Likert scale from 0 to 5.

In the interviews as well in the surveys a clear north-south gradient in the importance or strength of elements came to the foreground, with mostly a distinct clustering of the results in three major groups, being 1) Macaronesia and Mediterranean (south Europe), 2) the Atlantic Coast and Baltic (called middle Europe), and 3) the Arctic
No consistent distinctive patterns for the different stakeholder categories could be found. As a remarkable exception, in the surveys the stakeholder group of “Public Authorities” in Macaronesia fell within that of the Atlantic Coast, as if those Authorities are strongly connected or act according to the governance of the mainland (Portugal and Spain).

In the interviews only a few elements were perceived by most stakeholders (>50%) to be highly important all over Europe. These were for the ecological category Nature and Biodiversity, in the socio-economic category Economy and Large-scale Tourism, and as a pressure Pollution.
Though Large-scale Tourism is omnipresent and has a positive influence on the economy, it is judged to have a negative impact on the society and coastal developments. Therefore, governance bodies should formulate stronger rules and regulations to control and balance this pressure, and to find alternatives through small-scale tourism and diversification of activities.

Most other important elements mentioned in the interviews showed a geographic north-south gradient, and roughly a distinction can be made between the south (Macaronesia, Mediterranean), middle (Atlantic coast, Baltic) and north of Europe (Arctic).
Regarding the ecological elements, in south and north Europe a higher importance is given to conservation, protected areas, and iconic or exotic species, than in the middle of Europe. The influence of the exotic species is negative towards other elements.
Many economic activities are valuated of higher importance In the middle of Europe, such as large-scale fisheries, harbours, infrastructure and transport. Whereas, in the south and north of Europe less, and more small-scale and local, economic elements are viewed more important, such as SMEs, small-scale tourism, and local fisheries.

Though governance, rules and regulations at the national and international level are fairly important all over Europe, especially local rules and regulation are more important in south and north Europe than in the middle of Europe.
Also socio-cultural elements, as the society, are viewed more important in the south and north of Europe than in the middle of Europe.
In the north of Europe the pressure by climate change is perceived as more important than in the rest of Europe. A negative influence of agriculture on the other elements as e.g. water quality came especially in the Baltic to the foreground.

In additional surveys send to stakeholders they indicated that the management and monitoring of the coastal zone should become more adequate and consistent. To this end, the collaboration between government bodies and stakeholders should improve, whereby the governance bodies and agencies should communicate more and improve their coordination.
The majority of stakeholders however indicated that approaches as the Ecosystem Services concept (ESC) and tools as a Decision-Support System (DSS) are not in use.

# 1. Introduction

For the Horizon Europe projects Marine SABRES and MARBEFES one of the basic concepts is to embed, and thereby to inventory, views of stakeholders, policy and management organisations regarding their perceptions on the social ecological system of the coastal area they are connected to. Such will aid to co-produce with and for the stakeholders the proper tools and instruments for planning and decision making, and thereby to optimize use and management of marine coastal areas and to safeguard a healthy marine ecosystem and its biodiversity.

To this end, a first series of interviews and surveys with a wide range of stakeholders from all research areas in both projects has been organised in cooperation with members of all workpackages (WPs).

This deliverable deals with the results obtained from more than 230 surveys and interviews with stakeholders from all over Europe. The purpose of these stakeholder consultations at the research sites is to gather their opinions, thoughts and viewpoints on the balance between the ecology, economy and society in their coastal environment. This is done by performing surveys and Interviews. The final aim is to indicate which elements have to be highlighted to achieve a stakeholder supported management at the research areas.

The results are moreover aimed at supporting the research in the other WPs, and to form a basis for further stakeholder engagement towards further co-design and co-development in both projects. Therefore, all results of the interviews and surveys will be shared with all project members as well with the stakeholders. Workshops will be organized at short term to inform the stakeholders and to get feedback and recommendations by stakeholders to strengthen the impact of the obtained results and to build dedicated tools and instruments in the other WPs.

The present deliverable is a merger of the deliverables from two EU Horizon Europe project, i.e. Marine SABRES and MARBEFES.
Both deliverables are based on interviewing and surveying stakeholders using the same methods. Merging the data and reporting will help to enlarge the critical mass for the analyses and to increase the geographic coverage. Moreover, this merger illustrates the strong cooperation between the two sister-projects.

Individually the two deliverables are entitled as, and due for:

1) Marine SABRES WP2: Effective Multi-Actor Involvement and Co-Creation,
   Deliverable 2.1: Simple SES Design brief,
   due in month 15, i.e. November 2023.
2) MARBEFES WP1: Stakeholder Involvement and Governance Rules
   First Part of Deliverable 1.2: Report on stakeholders' recommendations regarding harmonization and integration of social-ecological frameworks,
   due in month 45, i.e. May 2026.

The early publication of the First Part of MARBEFES D.1.2 is appropriate since it ensures that the very rich data-set becomes available in time for the other WPs in MARBEFES and Marine SABRES.

In Appendix 12 to this Deliverable additional information on stakeholder engagement in the Arctic is published for Marine SABRES under the responsibility of the authors in that Annex, and following another approach than used in the studies performed by HuFoSS.

In the following sections, the main Marine SABRES and MARBEFES stakeholder engagement activities performed by HuFoSS and WP2 partners throughout 2023, as well as the results, are described.

# 2. Material and Methods

## 2.1. Stakeholder meetings

At the start of the stakeholder consultation process, for both projects, information flyers on the stakeholder engagement process were composed (Appendix 1). Contact Persons in the research areas were asked to use these flyers when contacting potential participants with the request to participate in the interviews and surveys.
In both projects stakeholders were always firstly approached by the Contact Persons of the partner institutes.

The contact persons were asked to approach in their research area an equal number of stakeholders within each stakeholder category. The four stakeholder categories recognised were:

- Public audience // Individual and collective action
- Industry and private sector // Economy and finance
- Public authorities // Governance
- Academia and research // Science and innovation

In an interactive process between the stakeholders who accepted the invitation, the contact persons, and the WP-leads, the planning for the visits to the stakeholder were planned.
Subsequently, stakeholders have been visited in a total of 15 research areas in both projects (Fig. 1).

Stakeholder interactions have taken place in the same way in all areas:

- All interviews and surveys were held in person, in most cases at the residence/institute of the stakeholder, yet sometimes they were invited to the contact person's host institute.
- Interaction with a stakeholder usually lasted around 2 hours.
- All stakeholder interactions in every research area were conducted in the same manner by the HuFoSS team following an on beforehand agreed detailed interview and survey protocol (Appendix 2).
- Before starting an interview or survey the stakeholders were requested to fill an Informed Consent Form regarding the GDPR and IPR issues (Appendix 3)
- All communication was conducted in English. If the interested party did not have sufficient command of the English language, then help was provided with translations by the Contact Persons. One or more colleagues from the partner institute on location fulfilled this role.

## 2.2. Locations: Demonstration Areas and Broad Belt Transects

Over an 8-months period, from February to September 2023, interviews and surveys took place in 15 research areas (Fig. 1, Table 1). This is the total sum of areas that are called in the MARBEFES project Broad Belt Transects (BBTs) and in the Marine SABRES project Demonstration Areas. All to be further called research areas.
From south to north, 5 regions can be identified: Macaronesia with 3 research areas, i.e. the Azores, Madeira and the Canary Islands. The Mediterranean with 4 research areas namely, the Gulf of Heraklion, the Balearic Islands, Sardinia and the Tuscan Archipelago. The Atlantic coast has 3 research areas, the Dublin – Liverpool Bay, the Belgian Doggerbank, and the Gulf of Biscay. Also the Baltic region has 3 research areas, namely the Gulf of Gdansk, the Curonian Lagoon and the Finnish Archipelago. Finally, in the Arctic region research took place in the Porsangerfjord and Svalbard. For the stakeholder consultations the two areas at Svalbard (Kongsfjord, Isfjord) have been treated as one research area to reach a sufficient number of consultations.

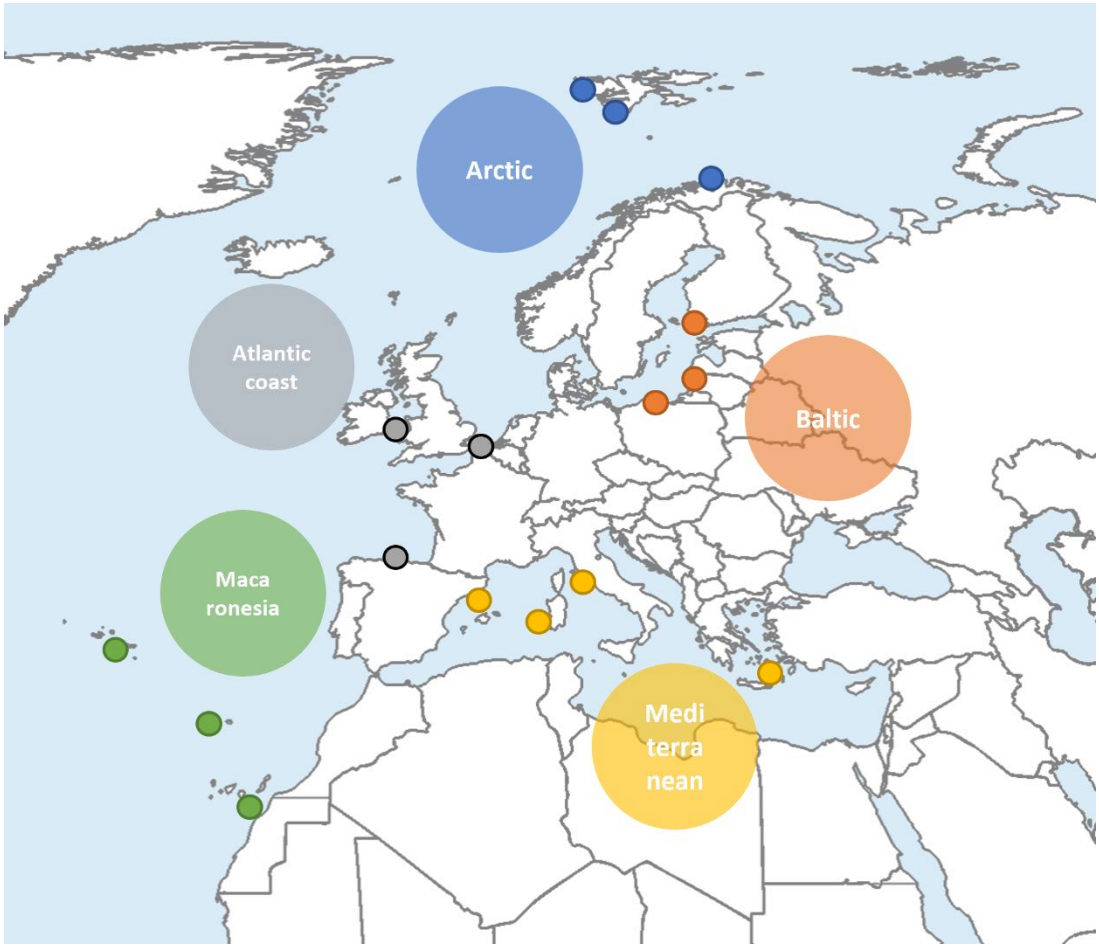



Figure 1. The location of the research areas (in Marine SABRES called Demonstration Areas (DA), in MARBEFES called Broad Belt Transects (BBT; the 2 areas at Svalbard, Kongsfjord and Isfjord, have been treated as one research area for the stakeholder consultations).

In total 231 stakeholders (SH) were visited of which 193 were interviewed and 198 participated in the surveys (Table 1). A more detailed overview of participants in each research area is given in Appendix 4.

Table 1. Location and dates of DA's and BBT's visited by the HuFoSS team and an overview of how many stakeholders participated in the survey and how many did the interview (*for Gulf of Biscay (or Santander) 1 interview was split in 2 mind maps).

| Location (DA / BBT) | Dates of the visit | Nr. of SH Interviewed | Nr. of SH Surveyed | Nr. of SH Total |
|---|---|---|---|---|
| MarineSABRES - Tuscan archipelago | 20-2-2023 - 23-2-2023 | 7 | 6 | 7 |
| MARBEFES - Sardinia | 27-2-2023 - 3-3-2023 | 10 | 11 | 16 |
| MARBEFES - Gulf of Biscay* | 13-3-2023 - 17-3-2023 | 10 | 13 | 18 |
| MarineSABRES - Azores | 27-3-2023 - 31-3-2023 | 18 | 17 | 20 |
| MARBEFES - Gulf of Heraklion | 3-4-2023 - 7-4-2023 | 18 | 18 | 20 |
| MARBEFES - Balearic islands | 18-4-2023 - 22-4-2023 | 13 | 13 | 16 |
| MARBEFES - Belgium Doggerbank | 25-4-2023 - 5-7-2023 | 14 | 14 | 14 |
| MarineSABRES - Madeira | 2-5-2023 - 5-5-2023 | 7 | 13 | 17 |
| MARBEFES - Finnish archipelago | 23-5-2023 - 26-5-2023 | 14 | 14 | 14 |
| MARBEFES - Curonian Lagune | 29-5-2023 - 31-5-2023 | 16 | 12 | 17 |
| MARBEFES - Porsangerfjord | 12-6-2023 - 16-6-2023 | 12 | 12 | 12 |
| MARBEFES - Svalbard | 12-6-2023 - 23-6-2023 | 17 | 13 | 17 |

| | | | | |
|---|---|---|---|---|
| MARBEFES - Dublin-Liverpool | 3-7-2023 - 14-7-2023 | 12 | 11 | 12 |
| MarineSABRES - Canary islands | 17-7-2023 - 20-7-2023 | 12 | 13 | 13 |
| MARBEFES - Gulf of Gdansk | 11-9-2023 - 14-9-2023 | 13 | 18 | 18 |
| Total | | 193 | 198 | 231 |

## 2.3. Interviews

In the interviews the stakeholders were asked to share their views on what are for their sector the most important elements in the balance between the ecology (nature), economy, and society in their coastal area, and what are the influences and pressures on this balance.

As methodological basis for the interviews the FCM technique (Kosko, 1986, 1988, 1993) was used whereby elements (i.e. all factors, actors, or processes being perceived important by the stakeholder; originally called concepts by Kosko, 1986) are depicted in diagrams as nodes that are connected with arrows showing the direction and strength of influence between the elements as perceived by the interviewed stakeholder (see example in Fig. 2, adopted from Hummel et al 2022)

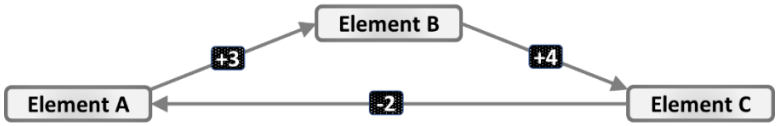



Figure 2: An example of the Fuzzy Cognitive Model whereby Elements such as factors (e.g. fish), actors (e.g. policies) or processes (e.g. eutrophication) form nodes in the diagram. Related Elements are connected with arrows (vectors) showing the direction and strength of influence between these Elements. The values of the vectors (ranging from -5 to +5) indicate the strength of the influence. An arrow with a positive value pointing from element A to element B indicates that element A increases or stimulates element B, and a negative arrow from element C to element A indicates that element C decreases element A. In this example a feed-back mechanism can be seen as element A increases element B which increases element C, which in turn decreases element A.

The interviews were performed with one stakeholder at a time, though more representatives per stakeholder were possible.
In the first phase of the interview the stakeholder was allowed to speak freely for about 10 to 15 minutes on the balance between the ecology (nature), economy, and society in their coastal area, and what the pressures are on this balance, without any interference by the interviewer. The interviewer in the meantime made notes on the factors, variables, actors, or processes, further to be called the elements, that were perceived by the stakeholders to be important.
In the second phase of the interview the stakeholders were asked to link the elements that influence each other and rate the strength of these relationships. The strength of the relationships could be more or less positive or negative (-5 to +5). The strength and direction of the dependencies and influences between the elements (that were written on magnetic cards) were mapped on a large (magnetic) poster. Thereby the interview resulted in a mind map that depicts what the stakeholder perceives as the key issues at play in their coastal area (Fig. 3).
The duration of the interview was each time about 1 hour.

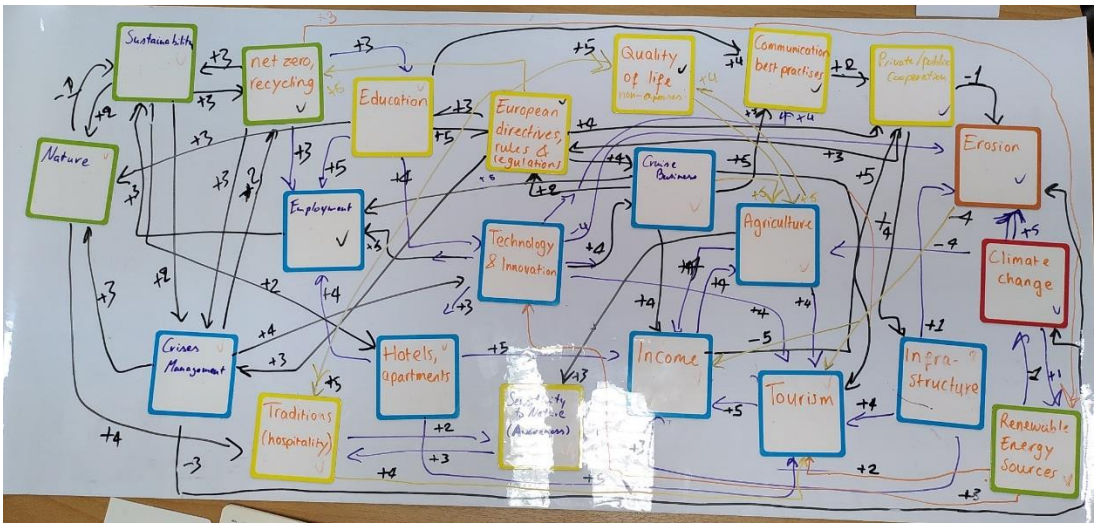



Figure 3. Example of a FCM network composed by a stakeholder, in this specific case resulting in a mind-map with 22 elements and many more interactions (vectors) between the elements.

Since different stakeholders used various synonyms for factually similar elements in their FCM diagrams, these elements were harmonised. For example, biodiversity, species diversity, and species, were all called biodiversity. This harmonisation resulted in 92 different elements (Appendix 5), which were further used to analyse the main characteristics of these FCM networks.

All FCM networks, or mind-maps, were turned into diagrams (example in Fig. 4) and matrices constructed by means of Mental Modeller software (www.mentalmodeler.org), that show the direction and strength of connections between different elements, so called adjacency matrices (Kosko, 1986). This was done with both the original elements provided by the stakeholders and the harmonised terms.

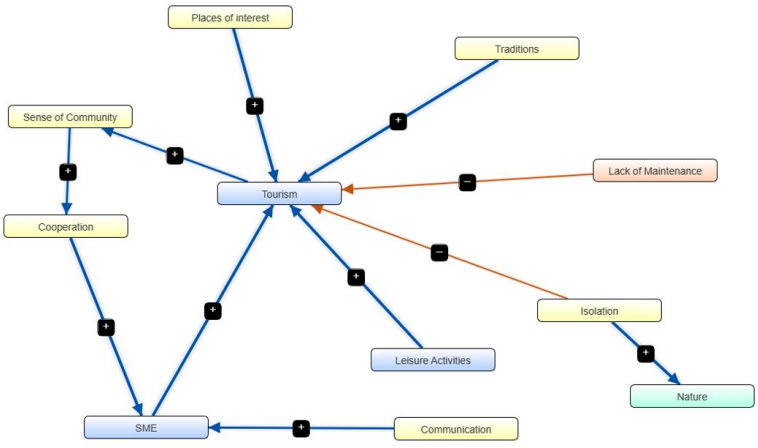



Figure 4. Example of a digitally processed mind map given by a stakeholder

On basis of the harmonised elements a set of indices was calculated to characterise stakeholder's FCM networks (Özesmi & Özesmi, 2003, 2004) (Table 2).
The calculations for the indices were performed by means of a dedicated programme in R. The basis for the analyses in R was the package 'FCMapper', developed by Shaun Turney. This was used as a basis for a script to easily and quickly perform the analyses in multitude. The functions that were used from this package were adjusted to fit our goals in data editing and analyses.

**Table 2.** Overview of indices based on results from interviews and their merit for discussions with, or actions such as management by, stakeholders (based on Ozesmy & Ozesmy 2003 and Hummel *et al.* 2022; the underscored abbreviations are new indices (FE, rFE and rCENT))

| **Interview indices** | **Abbrev.** | **Merit** |
|---|---|---|
| Total number of interviews per area | NI | Used for assessing the relation of other indices with the number of interviews |
| Total number of elements indicated by stakeholders in an area | NE | If high then there is a high diversity of viewpoints on essential elements to take into account in an area |
| Frequency of an element mentioned by stakeholders in an area (absolute number) | FE | If high then the element is perceived as important in a specific area and/or for a specific stakeholder group, and it can be a focal point for discussions and management |
| Frequency of an element mentioned by stakeholders in an area, relative to the number of interviews | rFE | If high then the element is perceived as important in a specific area and/or for a specific stakeholder group, and it can be a focal point for discussions and management |
| The total number of vectors (connections, arrows) between elements in a network | NC | The level and diversity of interactions between elements to take into account |
| Connection density – relative number of vectors (relative to maximum number possible) | CD | If high there is high potential for management options, yet if low, i.e. few elements are interconnected, then there are only few options to manage the area |
| Relative number of vectors per element | NC/NE | Indicates the complexity of the network |
| Outdegree – Absolute value of all outgoing vectors together | Out | If high those elements have a strong influence on other elements |
| Indegree - Absolute value of all incoming vectors together | In | If high those elements are strongly influenced by other elements |
| Centrality - sum of the (absolute) strengths of all vectors in a FCM | CENT | If high then in the system a couple of central elements have a strong impact on several other elements |
| Most important transmitter elements - elements with the most connections pointing away from them | MITE | Elements that have a forcing function in the system, influence several other elements, but are themselves often less influenced by other elements. Can be the starting points of PA management. |
| Most important receiver elements - elements with the most connections pointing towards them | MIRE | Elements that are influenced by other elements in the FCM, but do less influence other elements themselves. These elements are easily to be influenced by management or are possible outcomes of management |

To arrive at a practical set of elements that may form the core for further development of tools, discussions, and for management, a set of important elements has been selected whereby the degree of importance or strength of the elements was taken into account. The selection procedure took into account that elements that were important in only one research area also would become visible.
The selection included the following:
- for individual elements:

- 1) the frequency an element was mentioned among stakeholders. The frequency had to be at least 50 % among the interviews taken in a research area, or
- 2) the number of connections (vectors) from or to an element. The element had to have a number of vectors that is equal or higher than 50 % of the highest number from/to an element obtained in that area, or

- 3) the centrality, i.e. the strength it was connected to other elements. The average strength (on a scale from 1 to 5) of the vectors from or to an element had to be equal or higher than 50 % of the highest strength from/to an element obtained in that area.

- for elements in combinations (pairs) of elements:

- 4) the combination of elements had to be indicated in 10 or more interviews over all research areas (chapter 3.2.4), or
- 5) the receiving element in combinations (pairs) had to be belong to the top 30 on basis of the number of incoming vectors (chapter 3.2.2), or
- 6) the sending element in combinations (pairs) had to be belong to the top 30 on basis of the number of outgoing vectors (chapter 3.2.2).

The selection criteria yield by using an “or-or” approach, instead of “and-and”, as much as possible an inclusive overview to indicate what the important elements are in the various research areas.

## 2.4. Surveys

Stakeholders were asked to rank elements (given on cards) on a scoring-list (with a Likert ranking from 0 to 5) regarding the importance, or the degree/strength of presence, of that element for their sector in their area.
The elements were divided in the following seven categories (between brackets whether the importance of the strength of presence was asked):

1. Ecosystem Structure and Functions (e.g. biodiversity, nutrient cycle) (importance)
2. Ecosystem Services (e.g. food provision, climate regulation) (importance)
3. Socio-economic aspects (e.g. employment, income) (strength of presence / importance)
4. Socio-cultural values (e.g. sense of community, cultural identity) (strength of presence / importance)
5. a. Governance a (e.g. fairness, innovation etc.) (strength of presence)
5. b. Governance b: Rules and Regulations (e.g. MSFD, Natura 2000) (strength of presence)
6. Pressures (e.g. climate hazards, global warming) (extent)

The Likert scaling used for category 1, 2 indicated the level of importance of an element in an area (see Appendix 6), following:

0 = not present, I don't know, no opinion
1 = absolutely not important
2 = not important
3 = somewhat important
4 = important
5 = very important

The Likert scaling used for category 3, 4, 5a, 5b indicated the strength of the presence or importance of an element in an area (see Appendix 6), following:

0 = none, not present, I don't know, no opinion
1 = very weak
2 = weak
3 = moderate
4 = strong
5 = very strong

The Likert scaling used for category 6 indicated the extent of a pressure in an area (see Appendix 6), following:

0 = not present, I don't know, no opinion
1 = very small extent
2 = small extent

3 = to some extent
4 = large extent
5 = very large extent

Each category held 10 to 20 elements covering a wide range of issues. In total 93 elements were included in the surveys (see Appendix 6).
All elements were described in English and in the local language where needed. Finally the elements have been translated in Greek, Italian, Spanish, Portuguese, Norwegian, Lithuanian, Polish, Finnish, Swedish, Sami, and Kven.

The surveys could be performed individually or in group (workshop) setting.
The duration of the survey was about 1 hour.

The results were photographed (see examples in Fig. 5) and processed in Excel.

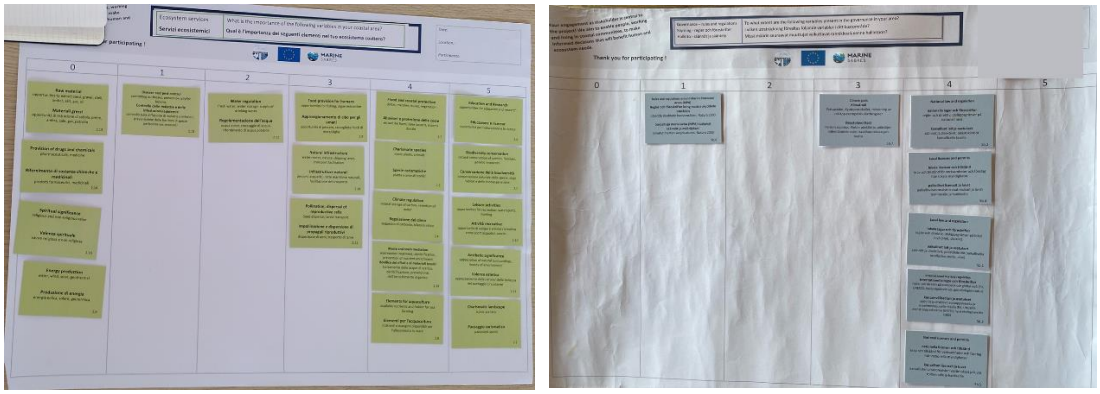


Figure 5. Examples of survey results given by a stakeholder, a) category Ecosystem Services (in English, Italian), b) category Governance – Rules & Regulations (in English, Swedish and Finnish).

All data were transcribed in Excel, and tables and figures were derived from it (chapter 3.3).
In order to analyse whether among the score on the elements in all surveys some classifications could be made a Principal Component Analysis (PCA) was performed, and Heatmaps drawn, by means of the Clustvis web tool (Metsalu & Vilo, 2015) to identify any pattern in the similarities or differences between research areas and/or stakeholder categories.

## 2.5. Additional stakeholder surveys

In addition to the standardised surveys carried out with stakeholders in the research areas an additional survey was send out by email to contact persons of the research areas and a selected group of stakeholders. The content of the additional survey was a series of questions related to the management, tools in use, and rules and regulations in the research areas. The questions are posed by Workpackage and Task leaders in both projects in order to aid in the development and co-design of the content of the projects (Appendix 7).
The replies received have been analysed and are reported in this deliverable.
The inventory is an ongoing activity, and therefore only the first results are indicated in this report. This activity will have a follow-up during the coming co-production activities between stakeholders and project members.

# 3. Results

## 3.1. Overview of stakeholders interviewed and surveyed

On an average 16 Stakeholders (SH) have been interviewed and/or surveyed in each research area (Fig. 6). In total 230 SH have been consulted. Since some SH were present with two or more representative in total about 300 representatives have been contributing. The four major categories of SH have been represented in almost equal numbers, yet the distribution could differ between areas (Table 3). The details per research area are shown in Appendix 4.

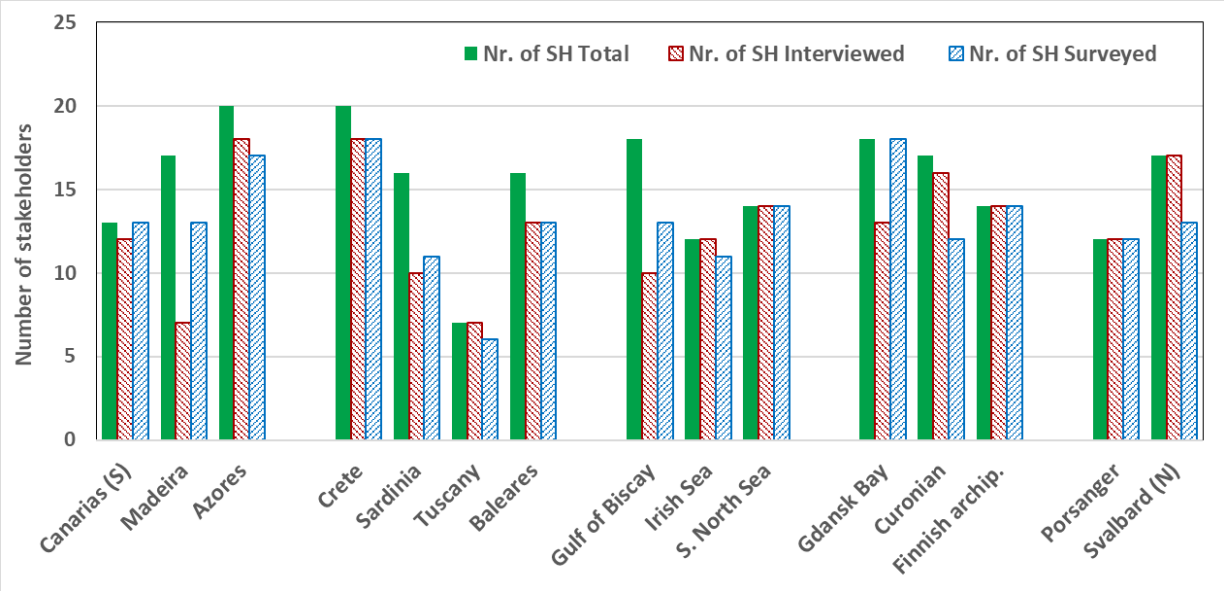



Figure 6. The number of stakeholders (SH) interviewed and/or surveyed at the research areas.

Table 3. Overview of stakeholder (SH) engagements per territory and per SH category (projects: MarSAB = Marine SABRES, MARB = MARBEFES

| Location (DA / BBT) | Project | Total SH | Public authorities | Public audience | Academia & research | Industry & private sector |
|---|---|---|---|---|---|---|
| Canary islands | MarSAB | 13 | 4 | 3 | 2 | 4 |
| Madeira | MarSAB | 17 | 7 | 0 | 8 | 2 |
| Azores | MarSAB | 20 | 3 | 7 | 2 | 8 |
| Gulf of Heraklion | MARB | 20 | 6 | 2 | 5 | 7 |
| Sardinia | MARB | 16 | 3 | 3 | 3 | 7 |
| Tuscan archipelago | MarSAB | 7 | 2 | 2 | 1 | 2 |
| Balearic islands | MARB | 16 | 8 | 4 | 2 | 2 |
| Gulf of Biscay | MARB | 18 | 7 | 2 | 4 | 5 |
| Irish Sea | MARB | 12 | 3 | 4 | 3 | 2 |
| S. North Sea | MARB | 14 | 3 | 6 | 5 | 0 |
| Gdansk Bay | MARB | 18 | 1 | 5 | 5 | 7 |
| Curonian lagoon | MARB | 17 | 5 | 4 | 3 | 5 |
| Finnish archipelago | MARB | 14 | 2 | 4 | 5 | 3 |
| Porsangerfjord | MARB | 12 | 1 | 2 | 3 | 6 |
| Svalbard | MARB | 17 | 3 | 3 | 5 | 6 |
| | | | | | | |
| Total | | 231 | 58 | 51 | 56 | 66 |

## 3.2. Interviews

### *3.2.1. General interview results*

The stakeholders in an area indicated together a total of 40 to 60 different harmonised elements during the interviews (Fig. 7). In a region the number of elements mentioned by all stakeholders together reached around 80. Thus, at an increasing number of interviews the number of unique elements mentioned by stakeholders is slowly increasing (Fig. 8), reaching a maximum of 92 elements mentioned by the stakeholders all over Europe.

Due to the variability in responses, around 20 stakeholders should be consulted to reach a fairly complete overview on all concepts (elements and vectors) mentioned during interviews (Özesmi & Özesmi 2003, 2004; Hummel et al 2022), as can be abstracted also from Figure 8. Since in most research areas the total number of consulted stakeholders was about 15 to 20 it will be possible to reach a proper overview of the perceptions on important concepts per research area. Yet, for a distinction of perceptions between stakeholder groups the numbers are too low (and variability too high), and therefore with regard to the interviews the focus will be laid on the outcomes per research area and eventual differentiation between areas and regions.

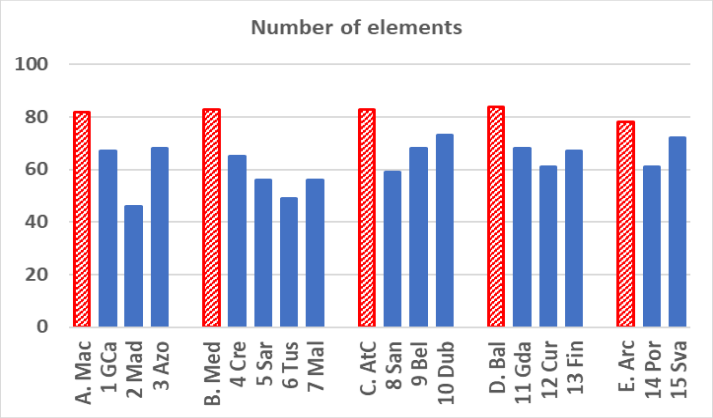



Figure 7. The number of different harmonised elements mentioned by the stakeholders together in a research area (blue bars) and in the geographic regions (red dashed bars) (regions are numbered with capital letters, areas with numbers from south to north; A. Mac= Macaronesia, 1 GCa= Gran Canaria, 2 Mad= Madeira, 3 Azo= Azores, B. Med= Mediterranean, 4 Cre= Crete, 5 Sar= Sardinia, 6 Tus= Tuscany, 7 Mal= Mallorca, C. AtC= Atlantic coast, 8 San= Santander, 9 Bel= Belgium, 10-Dub= Dublin and Liverpool, D. Bal= Baltic, 11 Gda= Gdansk Bay, 12 Cur= Curonian lagoon, 13 Fin= Finnish archipelago. E. Arc= Arctic, 14 Por= Porsanger, 15 Sva= Svalbard)

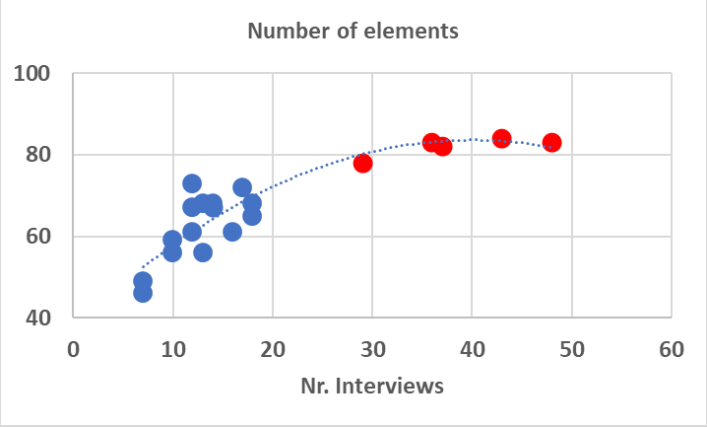



Figure 8. The number of elements mentioned by the stakeholders together in a research area (blue dots) and in the geographic regions (red dashed dots) in relation to the number of stakeholders interviewed at those locations (for the polynomic dotted line R = 0.91, p<0.01).

In each research area each element got on an average 4 to 6 incoming or outgoing connections to other elements (Fig. 9). When collating all unique connections mentioned by stakeholders in a region the number of connections ranged from 7 to 11 per element.

The number of unique connections indicated by the stakeholders clearly increased linearly with the number of interviews (Fig. 10).
Nevertheless, many more connections are possible. Namely, the connection density, i.e. the percentage of the maximum possible connections being realised in research areas or regions, did not rise above 14 % (Fig. 11). In theory 8372 connections are possible, and when collating all interviews in Europe together 2417 unique connections were mentioned, i.e. 29 %. This means that with each interview in each research area some new viewpoints on unique connections between elements are brought forward by the stakeholders.

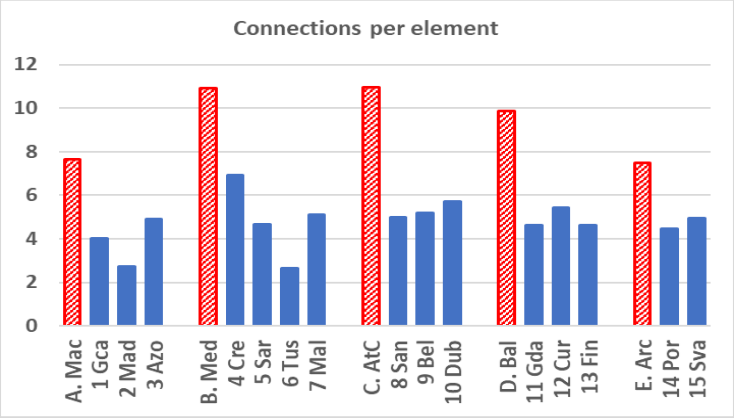



Figure 9. The average number of connections between harmonised elements mentioned by the stakeholders together in a research area (blue bars) and in the geographic regions (red dashed bar)

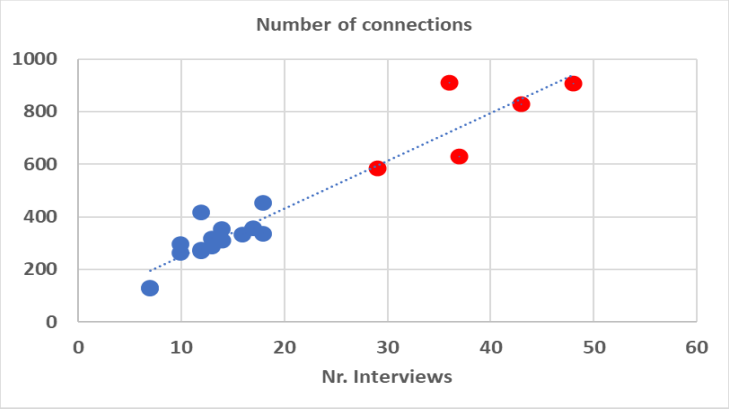



Figure 10. The average number of connections between harmonised elements mentioned by the stakeholders in relation to the number of interviews in a research area (blue dots) and in the geographic regions (red dots) (for the linear dotted line $R=0.96$, $p<0.001$)

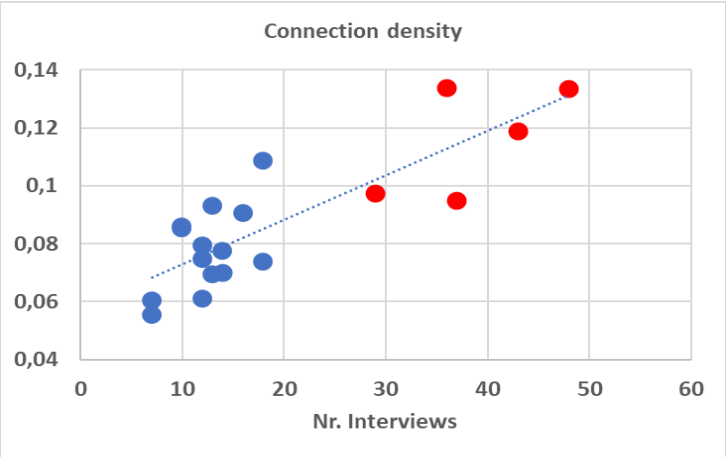



Figure 11. The average connection density (% of potentially possible connections realised) for the harmonised elements mentioned by the stakeholders together in a research area (blue dots) and in the geographic regions (red dots) in relation to the number of stakeholders interviewed at those locations (for the linear dotted line R=0.84, p<0.01)

### *3.2.2. The important elements mentioned in interviews*

To arrive at a practical set of elements that may form the core for further development of tools, discussions, and for management, a set of important elements has been selected whereby the importance was measured in the following ways:

- A) For individual elements on basis of:
  - 1) the frequency an element was mentioned among stakeholders had to be at least 50 % among those interviewed in a research area, or
  - 2) the number of connections (vectors) from or to an element had to be equal or higher than 50 % of the maximal number from/to an element obtained in that area, and
  - 3) the centrality, i.e. the strength of a connection between elements (max 5) had to be equal or higher than 50 % of the maximal strength from/to an element obtained in that area.
- B) For elements in combinations (pairs) of elements:
  - 1) the combination of elements had to be indicated in 10 or more interviews (chapter 3.2.4). Finally, 2417 different combinations were found among the 5303 pairs drafted during all interviews.
  - 2 and 3) the receiving or the sending elements in combinations had to be belong to the top 30 on basis of the number of incoming or outgoing vectors, respectively (chapter 3.2.2)

The list of all the important elements, following criterium A, is for each individual research area given in Appendix 8.

According the selection criteria fifty-four (54) elements were viewed to be important in one way or another.
An overview of all the important elements is presented in Appendix 9 (together with the remaining 38 elements not fulfilling the criteria)

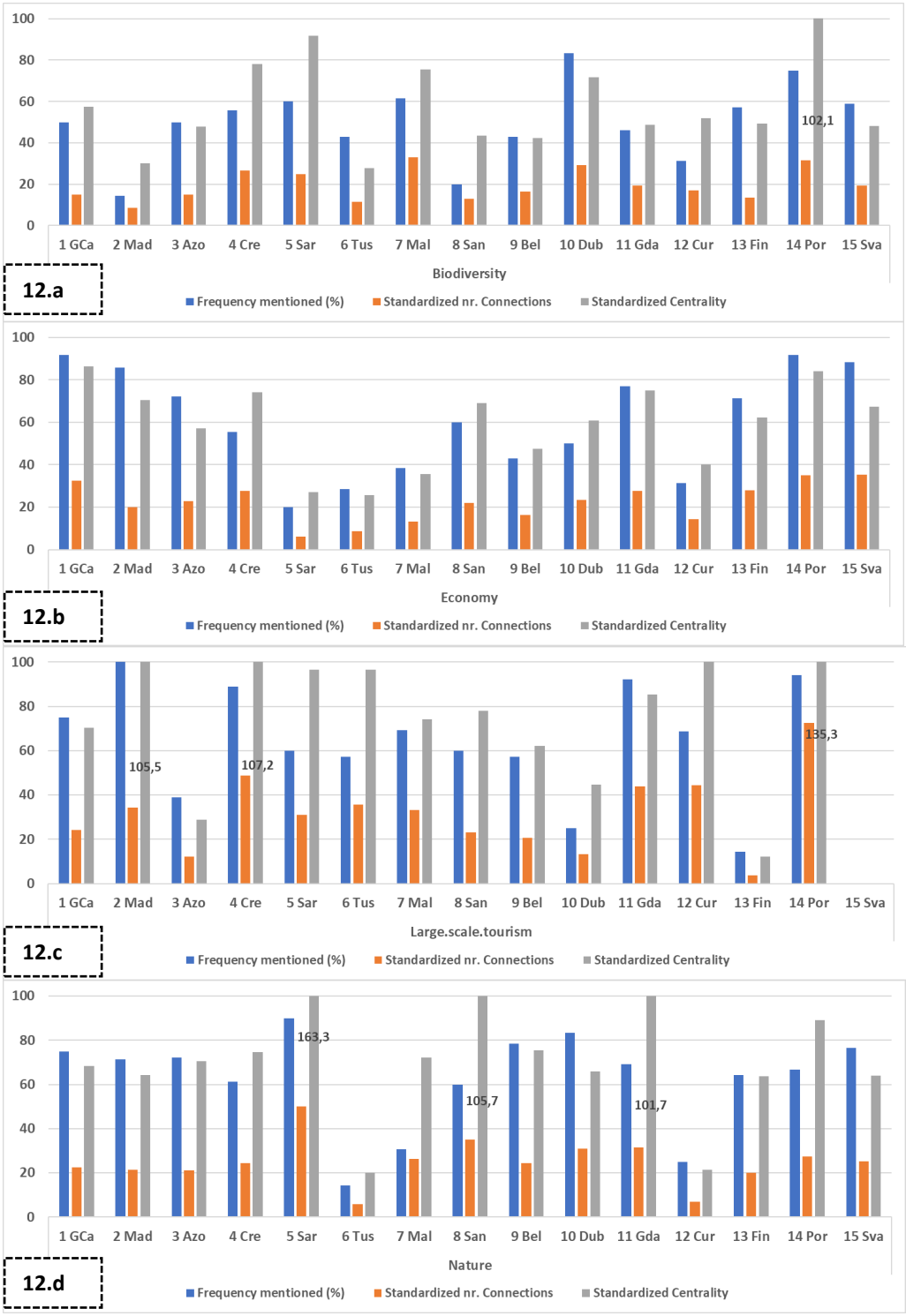
### *3.2.3. Geographic gradients for most important elements*

For all the elements that were in one way or another classified as important, i.e. 54 elements, their variation with regard to the 3 main descriptors (frequency, number of connections, centrality) has been depicted along a geographic gradient from South to North Europe in Appendix 10.
The most distinct elements scoring a very high importance or those showing a distinguishable geographic trend, and that may yield starting points for the development of tools and policy, are discussed below.

*3.2.3.1. The most important elements all over Europe*

Only a few elements are viewed by stakeholders to be all over Europe of high importance. These elements are mentioned at a frequency in between 50 to 100 % at almost all locations. They are:

- Biodiversity (Fig. 12.a)
- Economy (Fig. 12.b)
- Large-scale tourism (Fig. 12.c)
- Nature (Fig. 12.d)
- Pollution (Fig. 12.e)



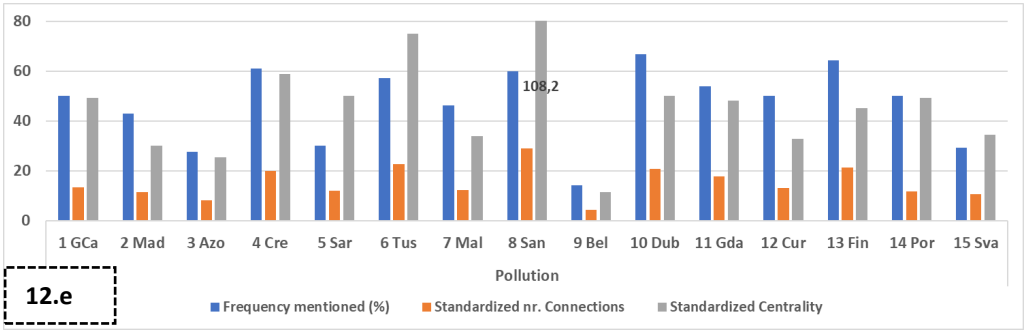



Figure 12. Elements with a high importance all over Europe (a: Biodiversity, b: Economy, c: Large-scale tourism, d: Nature, e: Pollution)

*3.2.3.2. Elements more important in the South of Europe*

A couple of elements have a higher importance in the southern European research areas (Macaronesia, Mediterranean), being:
- Implementation and Control of Rules (Fig. 13.a)
- Local Fisheries (Fig. 13.b)
- Protected Areas (Fig. 13.c)

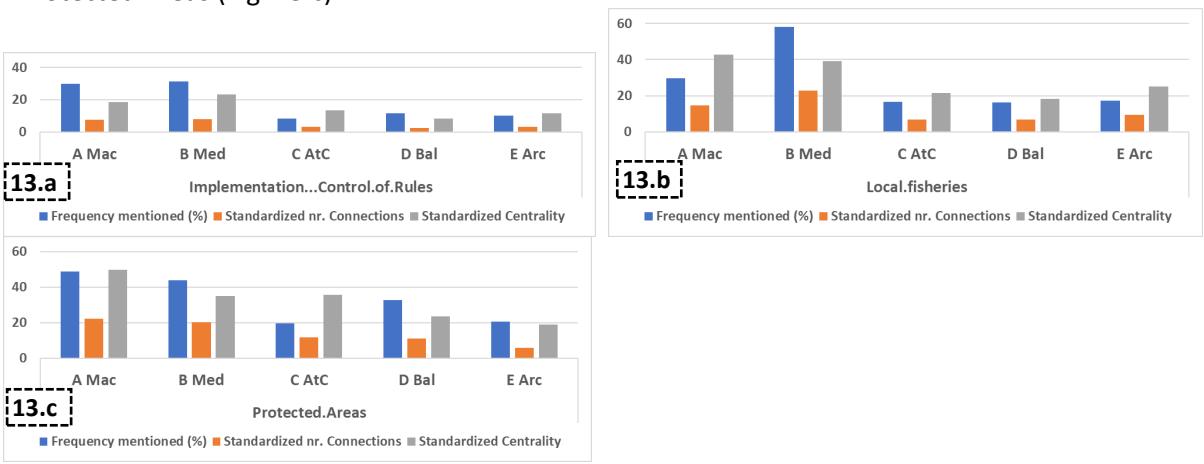



Figure 13. Elements with a higher importance in the South of Europe (a: Implementation and Control of Rules, b: Local Fisheries, c: Protected Areas

*3.2.3.3. Elements more important along the Atlantic Coast*

Stakeholders from the research areas along the Atlantic coast view several elements to be of higher importance than in other areas. For some elements in the Baltic or Mediterranean the importance can still be quite high. Yet, in the Arctic and Macaronesia these elements are far less important or even not mentioned. These elements are:
- Coastal Protection (Fig. 14.a)
- Collaboration (Fig. 14.b)
- Conflict of Interest (Fig. 14.c)
- Habitats (Fig. 14.d)
- Harbour (Fig. 14.e)
- Health and Quality of Life (Fig. 14.f)
- Infrastructure and Transport (Fig. 14.g)
- Renewables (Fig. 14.h)
- Spatial planning (Fig. 14.i)
- Urbanisation and Coastal Development (Fig. 14.j)
- Water, Air, and Sediment (geophysical) Characteristics (Fig. 14.k)

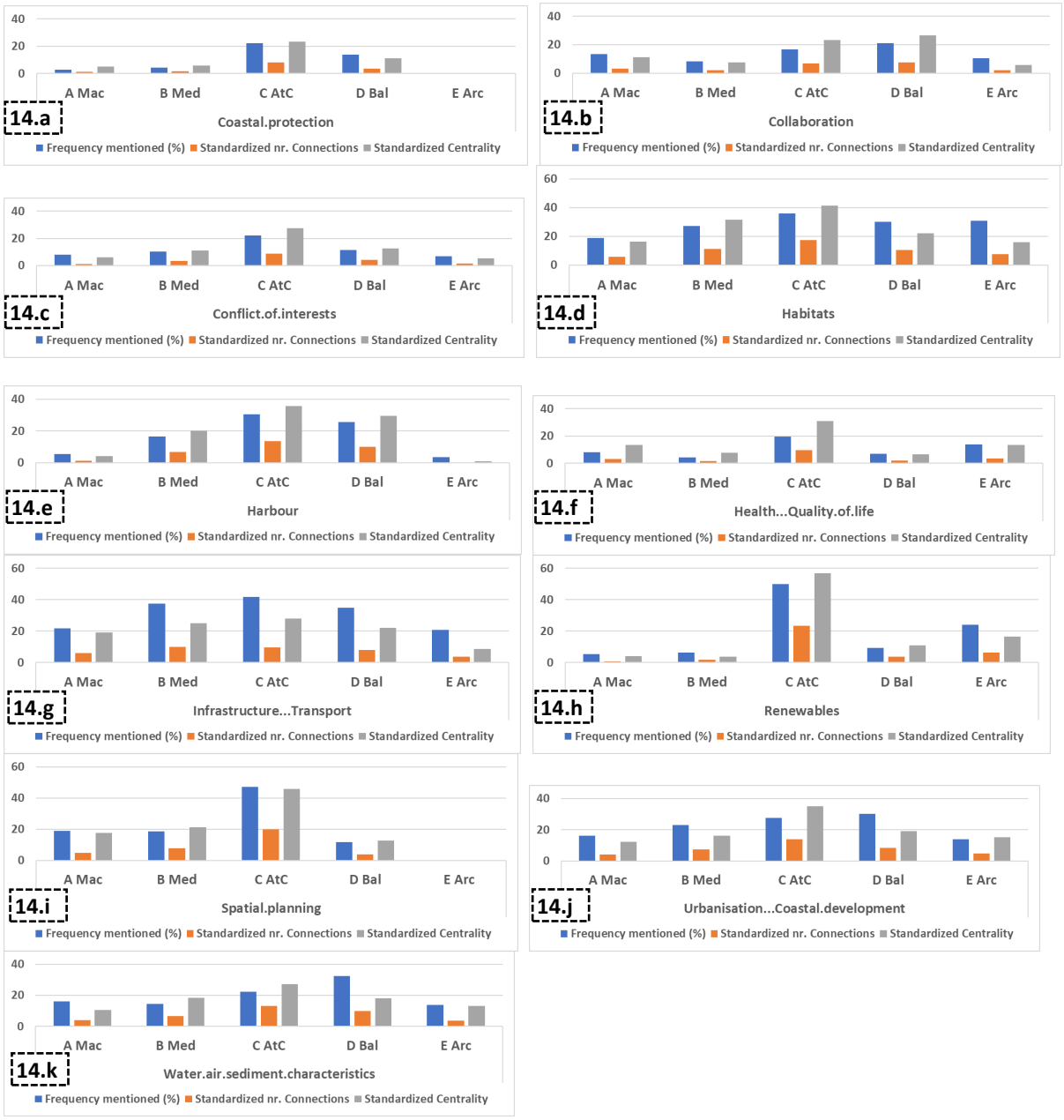



Figure 14. Elements with a higher importance or strength along the Atlantic coast and to a lesser extent in the other regions (a: Coastal Protection, b: Collaboration, c: Conflict of Interest, d: Habitats, e: Harbour, f: Health and Quality of Life, g: Infrastructure and Transport, h: Renewables, i: Spatial planning, j: Urbanisation and Coastal Development, k: Water, Air, and Sediment (geophysical) Characteristics)

### *3.2.3.4. Elements less important along the Atlantic Coast*

Some elements are, in contrast to the previous chapter, less important in the middle of Europe in comparison with the importance of the elements in both the South and to the North. These elements are:

- Conservation (Fig. 15.a)
- Local Rules and Regulations (Fig. 15.b)
- Small-scale Tourism (Fig. 15.c)
- SME (Fig. 15.d)
- Society (Fig. 15.e)

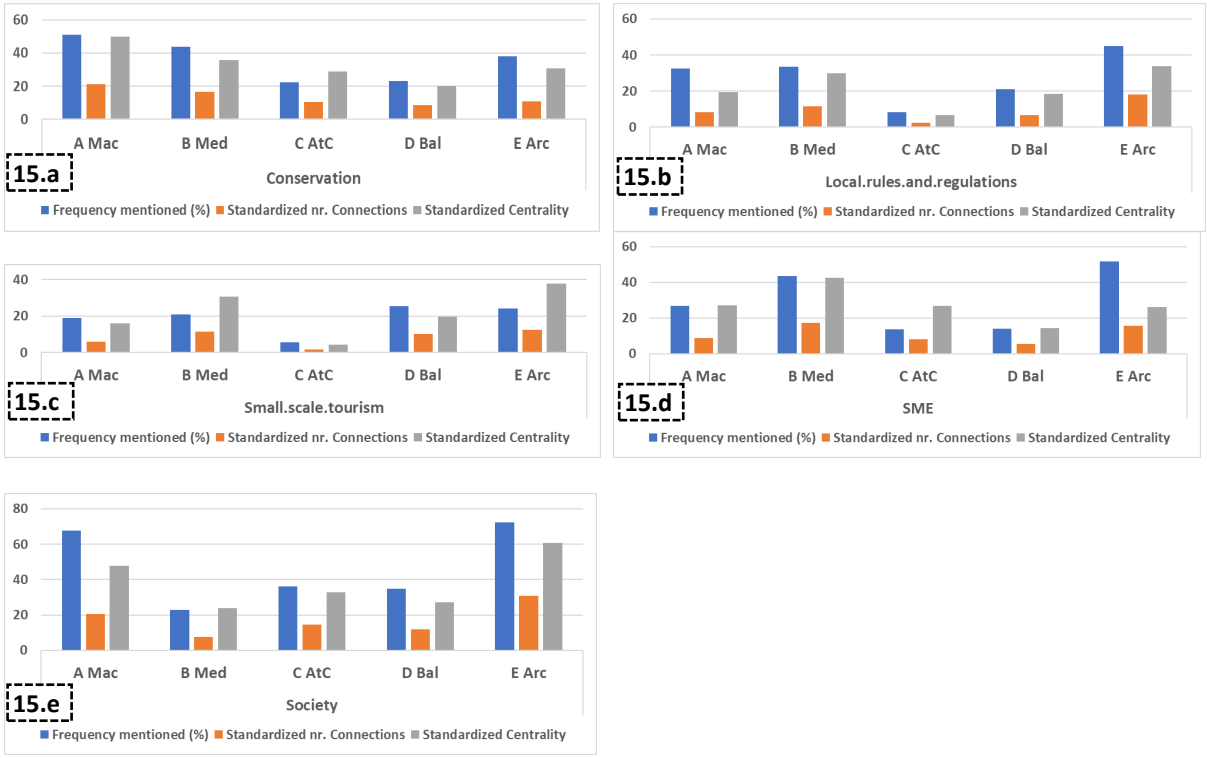






Figure 15. Elements being of lower importance or strength along the Atlantic Coast, and of higher importance in the other regions (a: Conservation, b: Local Rules and Regulations, c: Small-scale Tourism, d: SME, e: Society)

*3.2.3.5. The Baltic: Agriculture is a notable element for the sea*

In the Baltic research areas the element Agriculture stands out in comparison to the other areas (Fig. 16).

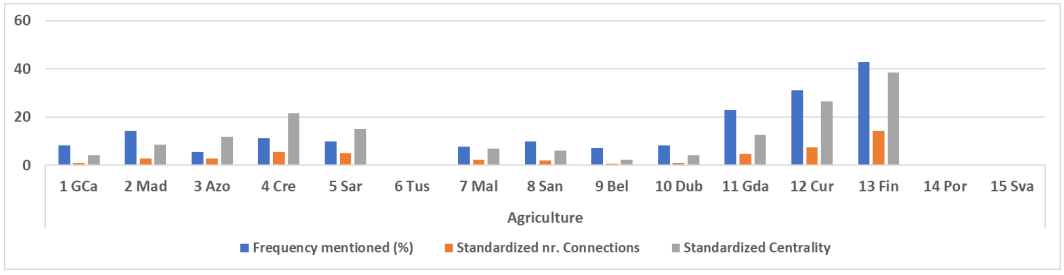



Figure 16. Agriculture is notably a more important element in the Baltic

*3.2.3.6. Elements more important in the North of Europe*

Quite some elements are of higher importance in the northern regions (Baltic, Arctic) and of lower importance in the southern regions, being:

- Climate Change (Fig. 17.a)
- Cultural Heritage and Traditions (Fig. 17.b)
- Exotic Species (Fig. 17.c)
- Income and Employment (Fig. 17.d)
- Large-scale Fisheries (Fig. 17.e)
- Seasonality (Fig. 17.f)

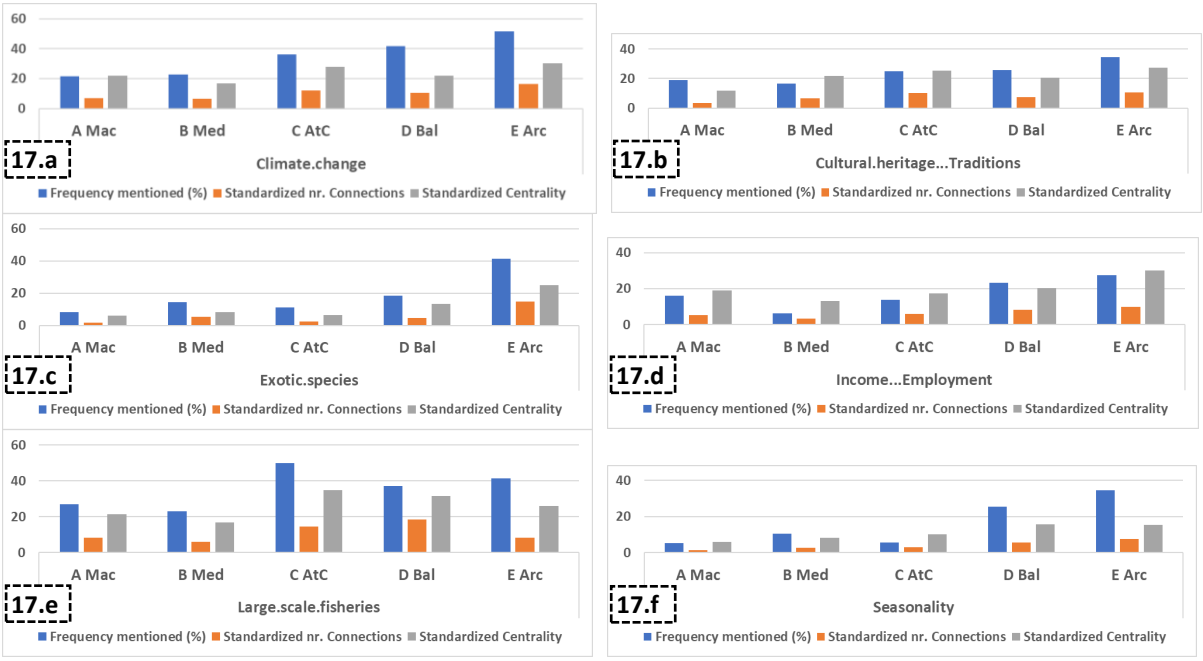



Figure 17. Elements being of higher importance or strength in the northern regions and of lower importance in the southern regions (a: Climate Change, b: Cultural Heritage and Traditions, c: Exotic Species, d: Income and Employment, e: Large-scale Fisheries, f: Seasonality)

### *3.2.3.7. The Arctic a special case: Porsanger Fjord*

With regards to the Arctic, special notice should be given to the Porsanger Fjord, since in this research area the stakeholders mentioned some unique elements that were given a high importance, being:
- Iconic Species (Fig. 18.a)
- Multicultural and Indigenous Society (Fig. 18.b)

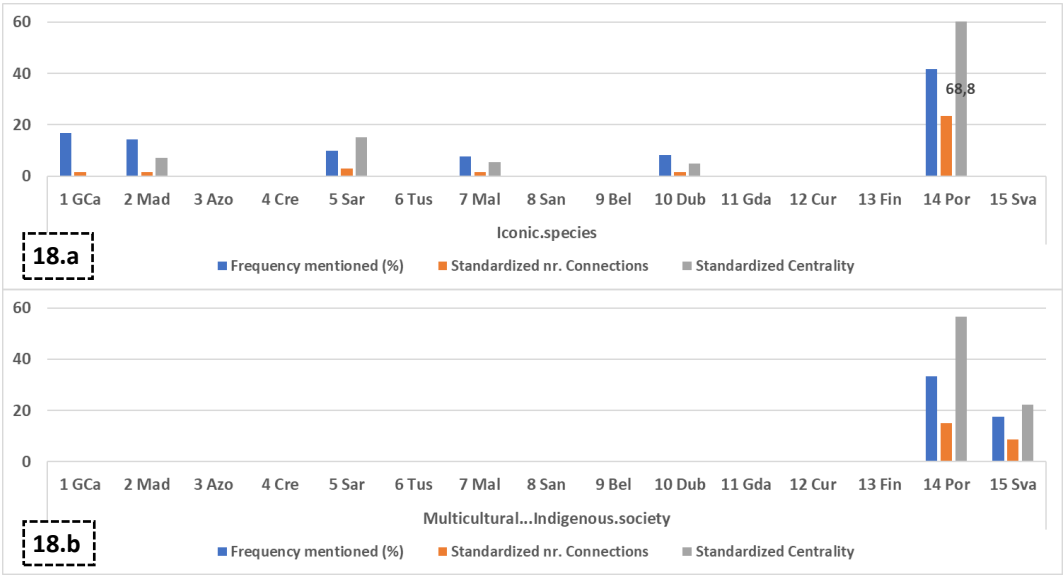



Figure 18. Iconic Species (a) and Multicultural and Indigenous Society (b) are important elements very specific for the Arctic, and especially in Porsanger Fjord.

### *3.2.3.8. Overview of major geographic trends*

A couple of distinct geographic trends can be found in the denomination of important elements over Europe as summarised in Table 5.

Only a few elements were perceived by most stakeholders all over Europe as very highly important, being in the ecological domain Nature and Biodiversity, in the economic domain Economy and Large-scale Tourism, and as a pressure Pollution. Socio-cultural and Governmental elements were not considered as being of that high importance.

Most other important elements do show a geographic gradient, and roughly a distinction can be made between the south (Macaronesia, Mediterranean), middle (Atlantic coast, Baltic) and north Europe (Arctic).

Regarding ecological elements, in south and north Europe a higher importance is given to Conservation, Protected Areas, and Iconic or Exotic Species, than in the middle of Europe.

At the other hand, many economic issues are valuated higher in the middle of Europe, such as Large-scale Fisheries, Harbours and Infrastructure and Transport, whereas in the south and north of Europe less, and more small-scale and local (SME, Small-scale Tourism, Local Fisheries), economic activities are viewed more important.

Similarly, in Governance also Local Rules and Regulation are more important in south and north Europe than in the middle of Europe.
And for the Socio-cultural elements, it is the Society that is viewed more important in the south and north of Europe.

In the north of Europe Cultural elements and the pressure Climate Change are perceived as more important than in the rest of Europe.

Table 5. Overview of the regions where various elements, indicated by stakeholders, are relatively of higher importance than in other areas, leading to geographic gradients in importance of those elements all over Europe. The elements mentioned under All Europe have all a very high importance all over Europe as perceived by more than 50 % of the stakeholders

| **Element Category** | **All Europe** | **South Europe (Mac, Med)** | **Middle Europe (AtC, Bal)** | **North Europe (Arc)** |
|---|---|---|---|---|
| | | | | |
| **Environmental / Ecological** | Nature | | Water, Air, Sediment Characteristics | |
| | Biodiversity | | Habitats | Exotic Species |
| | | Protected Areas | | Iconic Species |
| | | Conservation | | Conservation |
| | | | Coastal Protection | |
| **Socio-Economic** | Economy | | | Income & Employment |
| | | SME | | SME |
| | Large-scale Tourism | Small-scale Tourism | | Small-scale Tourism |
| | | Local Fisheries | Large-scale Fisheries | Large-scale Fisheries |
| | | | Renewables | Seasonality |
| | | | Agriculture | |
| | | | Collaboration | |
| | | | Conflict of Interest | |
| | | | Harbour | |
| | | | Infrastructure & Transport | |
| | | | Urbanisation & Coastal Development | |
| **Socio-cultural** | | Society | | Society |
| | | | Health & Quality of Life | Cultural Heritage & Traditions |

| | | | | |
|---|---|---|---|---|
| | | | | Multicultural & Indigenous Society |
| **Governance** | | Local Rules & Regulations | | Local Rules & Regulations |
| | | Implementation & Control of Rules | Spatial Planning | |
| **Pressures** | Pollution | | | Climate Change |

### *3.2.4. Most important combinations (pairs) of elements in interviews*

In total 2417 different combinations (pairs) of sending and receiving elements have been indicated by the stakeholders. Yet, most combinations (1345) were mentioned only once in an interview (Fig. 19). Considering the combinations that have been mentioned more than once, only 10 combinations of elements have been mentioned in 15 or more interviews (Table 6). The combination Large-scale Tourism (sending) to Economy (receiving) is of an outside category, being mentioned in 42 interviews (Table 6, Fig. 19).

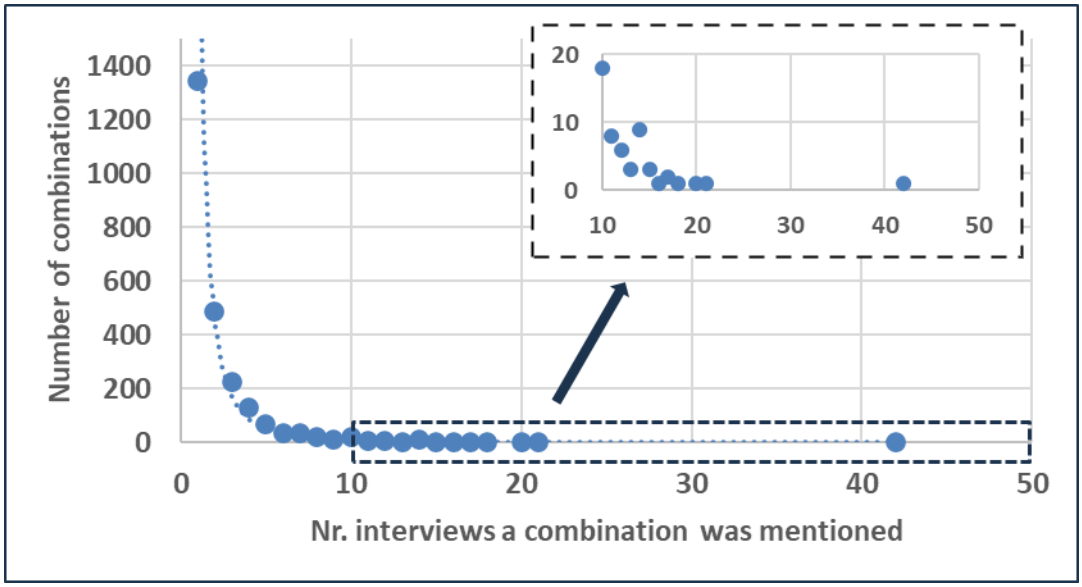



Figure 19. The number of specific combinations (pairs) of elements that have been mentioned once (1) or more often (upto 42 times) in the interviews with stakeholders (dotted powerline: $2446.x^{-2.4}$; R=0.98, p<0.001) The insert enlarges the part from ten interviews and more.

Table 6: The combinations of elements most often (i.e. 10 times and more) indicated by the stakeholders in all research areas.

| **Sending element** | **Receiving element** | **Number of interviews the connection was mentioned** |
|---|---|---|
| Large.scale.tourism | Economy | 42 |
| Economy | Society | 21 |
| Large.scale.tourism | Nature | 20 |
| Large.scale.tourism | SME | 18 |
| Conservation | Nature | 17 |
| Recreation...Leisure | Economy | 17 |
| Protected.Areas | Nature | 16 |
| Pollution | Water..air..sediment..characteristics | 15 |
| Small.scale.tourism | Economy | 15 |
| Education | Awareness...Knowledge | 15 |
| Industry | Pollution | 14 |

| | | |
|---|---|---|
| Pollution | Nature | 14 |
| Climate.change | Nature | 14 |
| Pollution | Biodiversity | 14 |
| Climate.change | Biodiversity | 14 |
| Large.scale.tourism | Recreation...Leisure | 14 |
| Awareness...Knowledge | Society | 14 |
| Climate.change | Exotic.species | 14 |
| Recreation...Leisure | Large.scale.tourism | 14 |
| Agriculture | Pollution | 13 |
| Disturbance | Biodiversity | 13 |
| Nature | Large.scale.tourism | 13 |
| Protected.Areas | Biodiversity | 12 |
| Habitats | Biodiversity | 12 |
| SME | Economy | 12 |
| Large.scale.tourism | Society | 12 |
| Research | Awareness...Knowledge | 12 |
| Pollution | Large.scale.tourism | 12 |
| Large.scale.tourism | Pollution | 11 |
| Biodiversity | Nature | 11 |
| Local.governance | Economy | 11 |
| Awareness...Knowledge | Conservation | 11 |
| International.governance | National.governance.and.policy | 11 |
| Nature | Awareness...Knowledge | 11 |
| Infrastructure...Transport | Large.scale.tourism | 11 |
| Economy | Large.scale.tourism | 11 |
| Sanitation | Pollution | 10 |
| Local.governance | Local.rules.and.regulations | 10 |
| National.governance.and.policy | Local.governance | 10 |
| Recreation...Leisure | Nature | 10 |
| Society | Nature | 10 |
| Sustainability | Nature | 10 |
| Water..air..sediment..characteristics | Biodiversity | 10 |
| Conservation | Biodiversity | 10 |
| Exotic.species | Biodiversity | 10 |
| Large.scale.fisheries | Biodiversity | 10 |
| Large.scale.tourism | Biodiversity | 10 |
| Industry | Economy | 10 |
| Society | Economy | 10 |
| Local.fisheries | Economy | 10 |
| Large.scale.tourism | Habitats | 10 |
| Research | Conservation | 10 |
| Protected.Areas | Large.scale.fisheries | 10 |
| Local.governance | Large.scale.tourism | 10 |

A detailed analyses of the most important sending and receiving elements, within combinations indicated in Table 6 is given in chapter (3.2.5).

### *3.2.5. Most important transmitting and receiving elements*

For the management of an area it may be of importance to know whether an element is influencing others, i.e. is it a sending element, or is it influenced itself by others, i.e. a receiving element.

An overview of the elements having the most outgoing connections (sending elements) and those having mainly incoming connections (receiving elements) is presented in Table 7 and Figure 20.

Among the elements with most connections (receiving plus sending vectors) several have an almost equal amount of sending and receiving connections, and thus influence as many elements as they are themselves influenced by others, being:

- Large-scale Tourism,
- Awareness & Knowledge,
- Protected Areas,
- Pollution,
- Recreation & Leisure.

Focussing on the elements that have a strong influence on other elements (Table 7), it is clear that most belong to governance, being

- Local.governance,
- National governance & Policy,
- National rules and regulations,
- International governance.

Further, economic elements may have also a strong influence, such as:

- Industry,
- Harbour,
- Aquaculture.

The following elements are from various categories and also have a strong influence on other elements:

- Collaboration,,
- Climate change
- Research,
- NGOs and Museums.

The elements that are under strong influence of other elements (Table 7) are mainly related to the:
- ecological environment, such as:

- Nature,
- Habitats,
- Biodiversity,
- Iconic species,

or belong to
- the socio-economic environment, such as:

- Economy,
- Income & Employment,
- Society,
- Health & Quality of life.

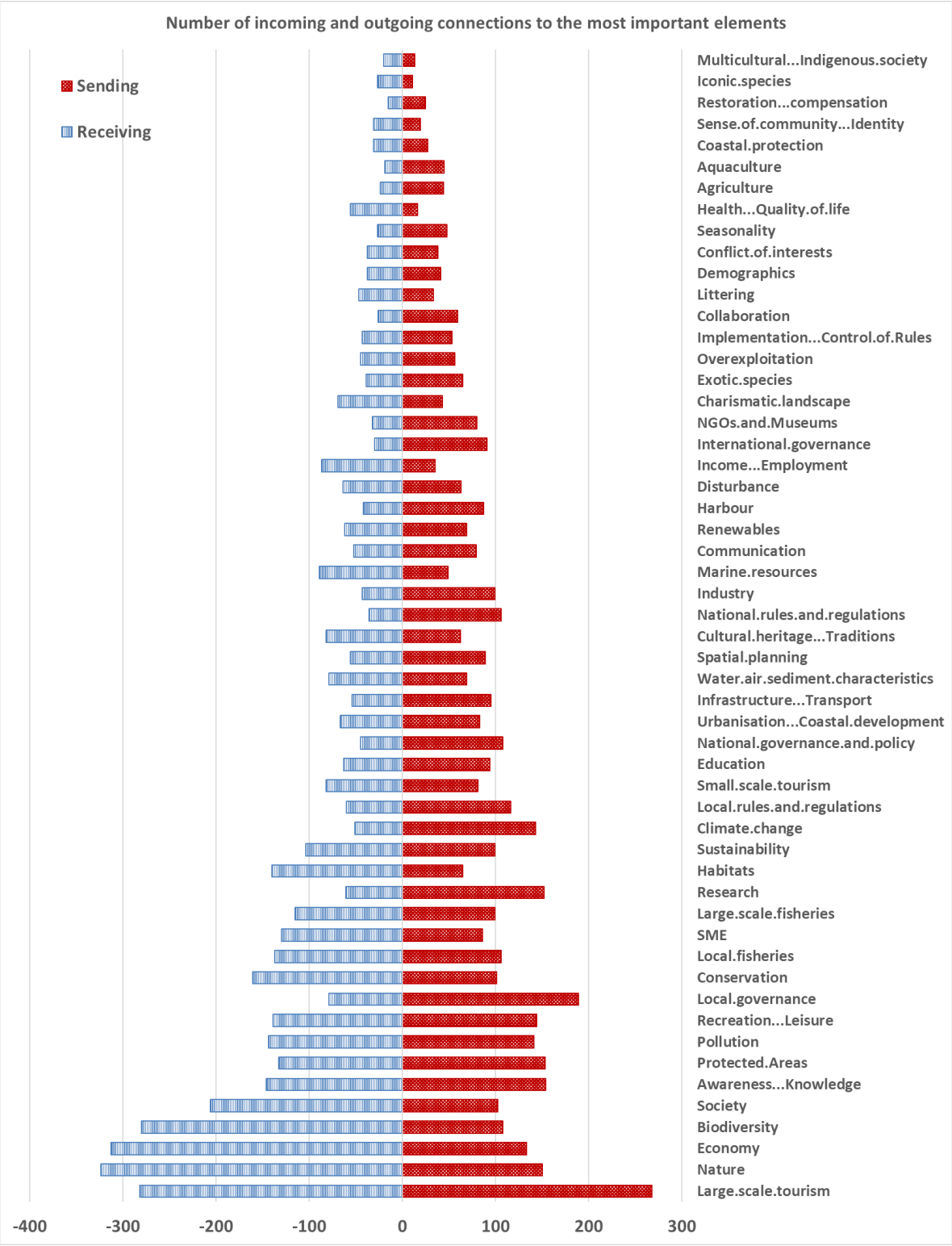



Figure. 20. The number of incoming and outgoing connections for the most important elements

Table 7. The total number of incoming and outgoing connections for the most important 54 elements. Blue cells indicate the elements are influenced through an incoming connections by other elements, red cells indicate the elements influence by means of an outgoing connection other elements (for dark coloured cells the ratio Incoming/outgoing is >2 (dark blue) or <0.5 (dark red), respectively; for light coloured cells the ratio, Incoming/outgoing >1.5 (light blue) or <0.75 (light red), respectively).

| Element | Incoming connections | Outgoing connections | Total connections |
|---|---|---|---|
| Large.scale.tourism | 282 | 268 | 550 |

| | | | |
|---|---|---|---|
| Nature | 324 | 150 | 474 |
| Economy | 313 | 133 | 446 |
| Biodiversity | 280 | 108 | 388 |
| Society | 206 | 102 | 308 |
| Awareness...Knowledge | 146 | 154 | 300 |
| Protected.Areas | 133 | 153 | 286 |
| Pollution | 144 | 141 | 285 |
| Recreation...Leisure | 139 | 144 | 283 |
| Local.governance | 79 | 189 | 268 |
| Conservation | 161 | 101 | 262 |
| Local.fisheries | 137 | 106 | 243 |
| SME | 130 | 86 | 216 |
| Large.scale.fisheries | 115 | 99 | 214 |
| Research | 61 | 152 | 213 |
| Habitats | 140 | 65 | 205 |
| Sustainability | 104 | 99 | 203 |
| Climate.change | 51 | 143 | 194 |
| Local.rules.and.regulations | 60 | 116 | 176 |
| Small.scale.tourism | 82 | 81 | 163 |
| Education | 63 | 94 | 157 |
| National.governance.and.policy | 45 | 108 | 153 |
| Urbanisation...Coastal.development | 67 | 83 | 150 |
| Infrastructure...Transport | 54 | 95 | 149 |
| Water.air.sediment.characteristics | 79 | 69 | 148 |
| Spatial.planning | 56 | 89 | 145 |
| Cultural.heritage...Traditions | 82 | 62 | 144 |
| National.rules.and.regulations | 36 | 106 | 142 |
| Industry | 43 | 99 | 142 |
| Marine.resources | 89 | 49 | 138 |
| Communication | 52 | 79 | 131 |
| Renewables | 62 | 69 | 131 |
| Harbour | 42 | 87 | 129 |
| Disturbance | 64 | 63 | 127 |
| Income...Employment | 87 | 35 | 122 |
| International.governance | 30 | 91 | 121 |
| NGOs.and.Museums | 32 | 80 | 112 |
| Charismatic.landscape | 69 | 43 | 112 |
| Exotic.species | 39 | 65 | 104 |
| Overexploitation | 45 | 56 | 101 |
| Implementation...Control.of.Rules | 43 | 53 | 96 |
| Collaboration | 26 | 59 | 85 |
| Littering | 47 | 33 | 80 |
| Demographics | 38 | 41 | 79 |
| Conflict.of.interests | 38 | 38 | 76 |
| Seasonality | 27 | 48 | 75 |
| Health...Quality.of.life | 56 | 16 | 72 |
| Agriculture | 24 | 44 | 68 |
| Aquaculture | 19 | 45 | 64 |
| Coastal.protection | 31 | 27 | 58 |
| Sense.of.community...Identity | 31 | 19 | 50 |
| Restoration...compensation | 15 | 25 | 40 |
| Iconic.species | 27 | 11 | 38 |
| Multicultural...Indigenous.society | 20 | 13 | 33 |
| | Element is influenced by incoming connections from other elements | Element is influencing other elements with outgoing connections | |

### *3.2.6. Elements most negatively or positively influencing others or being influenced*

Next to the direction a vector is connected to the elements, i.e. is it an incoming (for a receiving element) or an outgoing (for a sending element)(chapter 3.2.5), it is of importance to know whether an element is perceived by the stakeholders as a negative or positive factor.
To this end, the strength of the connections has been assembled per element, making a distinction between the sign of the connections from primarily sending elements (Fig. 21, Table 8) and those towards the primarily receiving elements (Fig. 22, Table 8). The indicated strength for the sending or receiving elements is the cumulation of the strengths of all outgoing and incoming connections, respectively, indicated by stakeholders for that specific element.

The overarching impression is that the stakeholders see mainly positive relationships between elements. This applies to both the mainly sending as the receiving elements. Only a few elements are negatively connected to other elements.

Mind however that a "+" (positive = stimulating, supporting, or increasing impact) or "-" (negative =, suppressing or decreasing impact) may be for the (ecological) system or the coastal (socio-economic) community in either case a positive or negative occurrence dependent on the context of the relation between the two elements.
For example, one of the combinations perceived by stakeholders being important is between Agriculture and Pollution (Table 6). Agriculture is a mainly positively (Table 8) sending (Table 7) element. However, this in fact means that Agriculture is increasing the Pollution, which will not be perceived by the society as a positive event.

The sending elements that stand out the most are (Fig 21, Table 8):
- mainly positive (= those with a cumulative positive strength of more than 250, stimulating, supporting, or increasing other elements):

- Nature,
- Research,
- Awareness & Knowledge,
- Large-scale Tourism,
- Protected Areas,
- Biodiversity,
- Local Governance,
- Conservation,
- Economy,
- Education,
- Sustainability,

- mainly negative (= those with a cumulative negative strength of more than -25, suppressing or decreasing other elements), all Pressures:

- Pollution,
- Disturbance,
- Overexploitation,
- Littering,
- Large-scale Fishing,
- Climate Change,
- Exotic species,
- Conflict of Interest.

The receiving elements that stand out the most are (Fig 22, Table 8):
- mainly positive (= those with a cumulative positive strength of more than 250, being stimulated, supported, or increased by other elements)

- Economy,
- Large-scale Tourism,
- Society,
- Awareness & Knowledge,
- SME,
- Conservation,

- mainly negative (= those with a cumulative negative strength of more than -25, being suppressed or decreased by other elements):

- Water, Air & Sediment Characteristics
- Large-scale Fishing


Figure 21. The sign (positive or negative) and strength of the most important sending elements (at the positive side the element is stimulating, supporting, or increasing other elements, at the negative side the element suppressing or decreasing other elements).

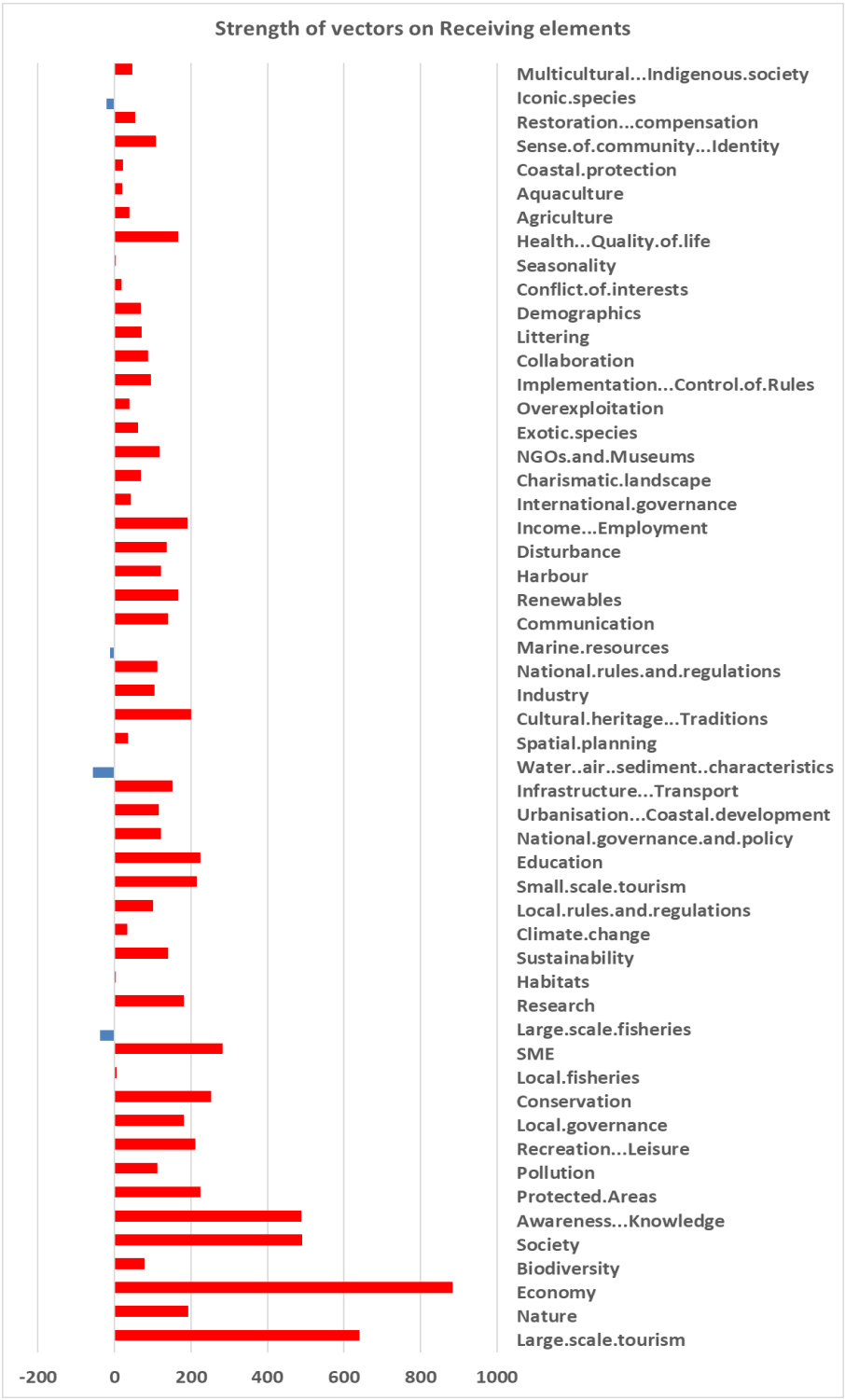



Figure 22. The sign (positive or negative) and strength of the most important receiving elements (at the positive side the element is stimulated, supported, or increased by other elements, at the negative side the element is suppressed or decreased by other elements).

Table 8. The sign (positive or negative) and strength of the important sending and receiving elements as perceived by the stakeholders (the strength is the cumulation of the strengths of all connections, outgoing and incoming, respectively, indicated by stakeholders for that specific element)

| Element | Strength as Sending Element | | | Strength as Receiving Element | | | Total connections |
|---|---|---|---|---|---|---|---|
| | Negative | Positive | | Negative | Positive | | |
| Large.scale.tourism | | 417 | | | 639 | | 550 |
| Nature | | 569 | | | 191 | | 474 |
| Economy | | 283 | | | 884 | | 446 |
| Biodiversity | | 366 | | | 78 | | 388 |
| Society | | 128 | | | 490 | | 308 |
| Awareness...Knowledge | | 462 | | | 488 | | 300 |
| Protected.Areas | | 384 | | | 223 | | 286 |
| Pollution | -240 | | | | 112 | | 285 |
| Recreation...Leisure | | 227 | | | 210 | | 283 |
| Local.governance | | 354 | | | 180 | | 268 |
| Conservation | | 347 | | | 252 | | 262 |
| Local.fisheries | | 111 | | | 5 | | 243 |
| SME | | 237 | | | 281 | | 216 |
| Large.scale.fisheries | -31 | | | -38 | | | 214 |
| Research | | 472 | | | 181 | | 213 |
| Habitats | | 228 | | | 3 | | 205 |
| Sustainability | | 349 | | | 139 | | 203 |
| Climate.change | -35 | | | | 33 | | 194 |
| Local.rules.and.regulations | | 12 | | | 100 | | 176 |
| Small.scale.tourism | | 226 | | | 215 | | 163 |
| Education | | 350 | | | 223 | | 157 |
| National.governance.and.policy | | 143 | | | 121 | | 153 |
| Urbanisation...Coastal.development | | 32 | | | 116 | | 150 |
| Infrastructure...Transport | | 130 | | | 151 | | 149 |
| Water..air..sediment..characteristics | | 103 | | -57 | | | 148 |
| Spatial.planning | | 125 | | | 35 | | 145 |
| Cultural.heritage...Traditions | | 155 | | | 200 | | 144 |
| Industry | | 113 | | | 104 | | 142 |
| National.rules.and.regulations | | 127 | | | 111 | | 142 |
| Marine.resources | | 160 | | -11 | | | 138 |
| Communication | | 239 | | | 139 | | 131 |
| Renewables | | 59 | | | 166 | | 131 |
| Harbour | | 214 | | | 120 | | 129 |
| Disturbance | -162 | | | | 136 | | 127 |
| Income...Employment | | 70 | | | 190 | | 122 |
| International.governance | | 163 | | | 42 | | 121 |
| Charismatic.landscape | | 165 | | | 69 | | 112 |
| NGOs.and.Museums | | 203 | | | 117 | | 112 |
| Exotic.species | -49 | | | | 61 | | 104 |
| Overexploitation | -148 | | | | 38 | | 101 |
| Implementation...Control.of.Rules | | 78 | | | 94 | | 96 |
| Collaboration | | 200 | | | 87 | | 85 |
| Littering | -90 | | | | 71 | | 80 |
| Demographics | -22 | | | | 68 | | 79 |
| Conflict.of.interests | -41 | | | | 17 | | 76 |
| Seasonality | | 17 | | | 2 | | 75 |
| Health...Quality.of.life | | 65 | | | 165 | | 72 |
| Agriculture | | 105 | | | 39 | | 68 |
| Aquaculture | -5 | | | | 20 | | 64 |
| Coastal.protection | -17 | | | | 21 | | 58 |
| Sense.of.community...Identity | | 69 | | | 107 | | 50 |
| Restoration...compensation | | 84 | | | 54 | | 40 |
| Iconic.species | | 48 | | -21 | | | 38 |
| Multicultural...Indigenous.society | | 33 | | | 45 | | 33 |

### *3.2.7. Summary on the important elements in European regions in interviews*

In the previous chapters of section 3.2 the most important elements in the balance between nature, economy and the society as perceived by stakeholders in the research areas have been evaluated in various ways. Firstly, for each research area the individual elements mentioned by the stakeholders with the highest frequency, centrality or number connections were selected (Appendix 8). Then, the elements showing a clear geographic gradient (Table 5, Appendix 10) were collated, followed by those most often mentioned in combinations (pairs) of elements (Table 6). Subsequently, the elements belonging to the top 30 of sending or receiving elements (Table 7) were selected, and finally the elements with the strongest negative or positive connections (Table 8).

All those elements being important on basis of one or more of these criteria have been summarised in table 9.
The majority (70 %) of these important elements could also be selected on basis of the analysis of geographic gradients, most of them specifically in the various regions (Table 5). Consequently, the elements categorised additionally as important on basis of the other criteria do fall almost all under 'All Europe", which means they are in all areas of Europe of equal importance.

Most of these additional important elements are sending elements. A larger part of these additional elements belongs to the category of 'Socio-cultural', 'Governance' and 'Pressures', doubling the number of important elements in these categories.
The additional elements belonging to the 'Socio-cultural' and 'Governance' category are in general positively sending elements and thus do support, strengthen or increase other elements.
The last elements, belonging to Pressures, are being judged to be negative, so sending elements with a negative influence on other elements. This makes that next to the observed higher importance of Climate Change in the north of Europe, also other Pressures, as Disturbance, Littering and Overexploitation should be taken into account all over Europe.

The clear distinction between three major districts as described before (chapter 3.2.3.8) remains largely the same, i.e. the south (Macaronesia, Mediterranean), middle (Atlantic coast, Baltic) and north Europe (Arctic).
The main distinctive aspects are a dominance of more and larger-scale economic elements in the middle of Europe, whereas smaller-scale and local economic aspects were viewed more important in the south and north of Europe. Moreover, ecological aspect with conservation or protection are perceived more important in the north and south than in the middle of Europe.
Similarly, among Governance the 'Local Rules and Regulations' are more important in south and north Europe than in the middle of Europe. Yet, with the additional important elements it becomes clear that in Governance also the national and international policies, as sending elements, may have quite some influence and such all over Europe.

Table 9. Overview of the sign (+ = positive or - = negative) and the sending (s) or receiving (r) traits of the most important elements in the geographic regions of Europe as indicated by stakeholders. The elements in bold and underlined under "All Europe" have a very high importance all over Europe as perceived by more than 50 % of the stakeholders (table 5), the other elements (*in italics*) were mentioned at a lower frequency. The elements in bold under the regions were classified as important at one of the research areas (table 5), the other elements (*in italics*) were mentioned as one of the higher scoring elements in the combinations of elements, or as an element being a strong sending or receiving, or having a high negative or positive strength

| Category of elements | All Europe | | | South Europe (Mac, Med) | | | Middle Europe (AtC, Bal) | | | North Europe (Arc) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Environmental / Ecological** | **Nature** | r | s+ | **Protected Areas** | | s+ | **Water, Air & Sediment Characteristics** | | r- | **Conservation** | r | s+/r+ |
| | **Biodiversity** | r | s+ | **Conservation** | r | s+/r+ | **Habitats** | r | | **Iconic Species** | r | |
| | *Sustainability* | | s+ | | | | **Coastal Protection** | | | **Exotic Species** | s | s- |
| **Socio-Economic** | **Economy** | r | s+/r+ | **SME** | r | r+ | **Large-scale Fisheries** | | s-/r- | **SME** | r | r+ |
| | *Industry* | s | | **Small-scale Tourism** | | | **Renewables** | | | **Income & Employment** | r | |
| | **Large-scale Tourism** | | s+/r+ | **Local Fisheries** | | | **Conflict of Interest** | | | **Seasonality** | s | |
| | *Recreation & Leisure* | | | | | | **Agriculture** | | | **Small-scale Tourism** | | |
| | | | | | | | **Collaboration** | s | | **Large-scale Fisheries** | | s-/r- |
| | | | | | | | *Aquaculture* | s | | | | |
| | | | | | | | **Harbour** | s | | | | |
| | | | | | | | **Infrastructure & Transport** | s | | | | |
| | | | | | | | **Urbanisation & Coastal Development** | | | | | |
| **Socio-cultural** | *Awareness & Knowledge* | | s+/r+ | **Society** | r | r+ | **Health & Quality of Life** | r | | **Society** | r | r+ |
| | *Education* | s | s+ | | | | | | | **Multicultural & Indigenous Society** | r | |
| | *Research* | s | s+ | | | | | | | **Cultural Heritage & Traditions** | | |
| **Governance** | *Local Governance* | s | s+ | **Local Rules & Regulations** | s | | **Spatial Planning** | s | | **Local Rules & Regulations** | s | |
| | *National Governance & Policy* | s | | **Implementation & Control of Rules** | | | | | | | | |
| | *National Rules & Regulations* | s | | | | | | | | | | |
| | *International Governance* | s | | | | | | | | | | |
| **Pressures** | **Pollution** | | s- | | | | | | | **Climate Change** | s | s- |
| | *Disturbance* | | s- | | | | | | | | | |
| | *Littering* | | s- | | | | | | | | | |
| | *Overexploitation* | | s- | | | | | | | | | |

| | | |
|---|---|---|
| r | | mainly receiving element |
| s | | mainly sending element |
| | s+/r+ | vectors send out (s) and vectors received (r) are mainly positive |
| | s-/r- | vectors send out (s) and vectors received (r) are mainly negative |

## 3.3. Surveys

In total 198 stakeholders ranked, on behalf of their professional sector, the 93 elements in the surveys, with a ranking of 0, for not existing or not known, to 5, for very important or very high strength in their coastal area. The elements were pre-formulated by scientists from both projects.

Overall the stakeholders that completed the surveys were almost evenly distributed across the 4 stakeholder categories:

- 51 in Academia and research // Science and innovation
- 45 in Public audience // Individual and collective action
- 48 in Public authorities // Governance
- 54 in Industry and private sector // Economy and finance

### *3.3.1. The importance of elements in surveys*

Assembling the results of the surveys per research area showed there is a high variation between stakeholders in their individual scores on importance of elements. Such a variation is still visible when comparing the 4 different categories of stakeholders in a research area (Fig. 23a,b), yet the differences are not consistent. Consequently, in the overall statistical analysis there are no consistent significant results visible with regard to different stakeholder categories (chapter 3.3.4).

In addition, at two nearby research areas, Tuscan and Sardinia, the distribution of surveyed stakeholders was coincidental skewed and different for both locations, i.e. with more stakeholders from the Industry category in Tuscany (36% versus 14 %), and reverse numbers for Public Authorities and Public Audience. Different outcomes might them be expected, yet even at close comparison (comparing Fig. 24a and b) the results are still strongly similar. Elements scoring high do so at both locations, and those scoring low do so also at both locations.
This may indicate that belonging to a specific region may be more important for the perception of the importance of elements than belonging to a specific stakeholder category.

Nevertheless, still a few trends with regard to differences between stakeholder categories could be found (chapter 3.3.4), and to express those trends the results for the surveys are also shown per stakeholder category, next to the results per region which showed several significant differences (chapter 3.3.4).

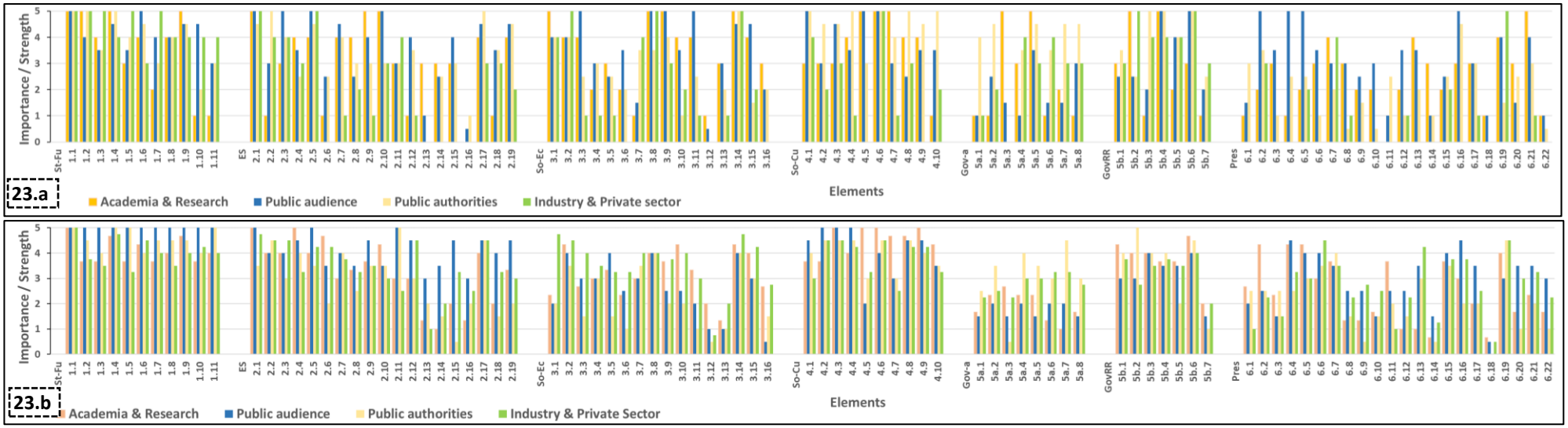



Figure 23. Average importance/strength of the elements per category for the 4 stakeholder groups from the Tuscan archipelago (a) and Sardinia (b) (blue = Public Audience, yellow = Industry & Private Sector, orange = Public Authorities, green = Academia & Research; St-Fu = Ecosystem functions and structures, ES = Ecosystem services, So-Ec = Socio-economic aspects, So-Cu = Socio-cultural aspects, Gov a = Governance (general principles), GovRR = Governance: Rules and Regulations, Pres = Pressures; all numbers refer to the numbered elements in Appendix 6).

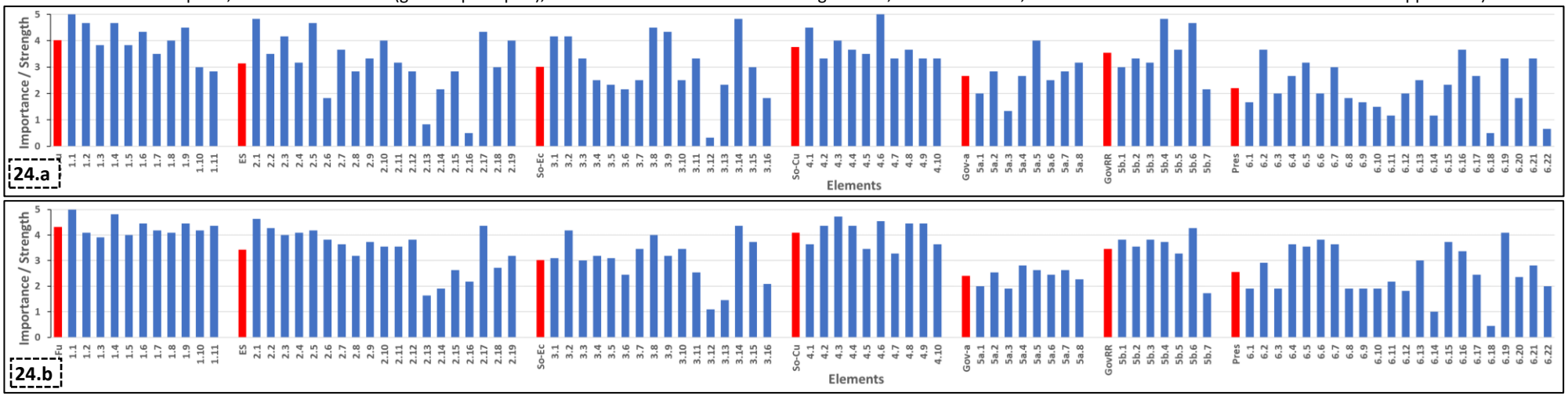



Figure 24. Importance/strength of elements averaged for all stakeholders from the Tuscan archipelago (a) and Sardinia (b) (blue columns give the average of all stakeholder groups per element, red columns give the overall average for all stakeholders per element category).

### *3.3.2. Most important elements in surveys per region and stakeholder category*

#### *3.3.2.1. Ecosystem structure and function*

The topic and question to the stakeholders was:
Structure and Function of the Marine Ecosystem: What is the importance of the following variables in your coastal area?
The elements questioned are given in Table 10.

The general observations on the marine ecosystem structures and functions were (Figs. 25, 26):

- All elements received a rather high score (3.8 out of 5) all-over Europe.
- 'Biodiversity', 'Habitats' and 'Resilience' were judged of high importance (above 4 out of 5), whereas 'Sediment Characteristics' is relatively the least important (3.2)
- There is a strong resemblance between stakeholders from different regions in scoring the importance of elements. Also there is a strong resemblance between the different categories of stakeholders

**Table 10**: Overview of the elements on Ecosystem Structure and Function of the Marine Ecosystem questioned in the Stakeholder surveys

| St-Fu | Structure and functions of marine ecosystems | Description |
|---|---|---|
| 1.1 | Biodiversity | diversity of plants, animals, fungi |
| 1.2 | Element/nutrient cycle | carbon, nitrogen, oxygen, water purification |
| 1.3 | Food chain energy transfer | energy pyramid, food web, primary and seccondary production |
| 1.4 | Habitats | breeding / feeding grounds / finding shelter / growing area |
| 1.5 | Hydrodynamics | natural water flow, tidal flow, waves, currents |
| 1.6 | Population dynamics | gene pool, species distribution, predation, reproduction |
| 1.7 | Sediment characteristics | soil composition, rocks |
| 1.8 | Water surface characteristics | temperature, salinity, turbidity |
| 1.9 | Resilience | potential of the ecosystem to recover from change or stress |
| 1.10 | Weather | temperature, sunshine, rain, evaporation |
| 1.11 | Land- and sea-scape | overall layout of the surroundings, sea-view, countryside |

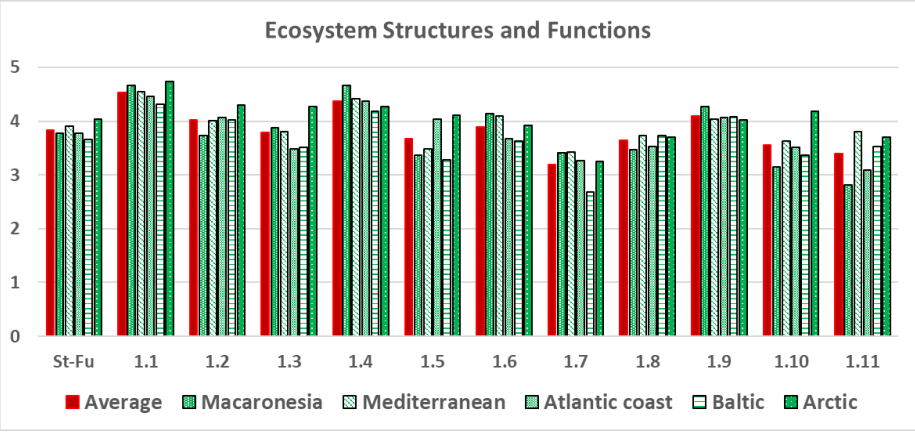



Figure 25. The importance of Ecosystem Structures and Functions in the research areas according the viewpoints of the stakeholders (averages per region).

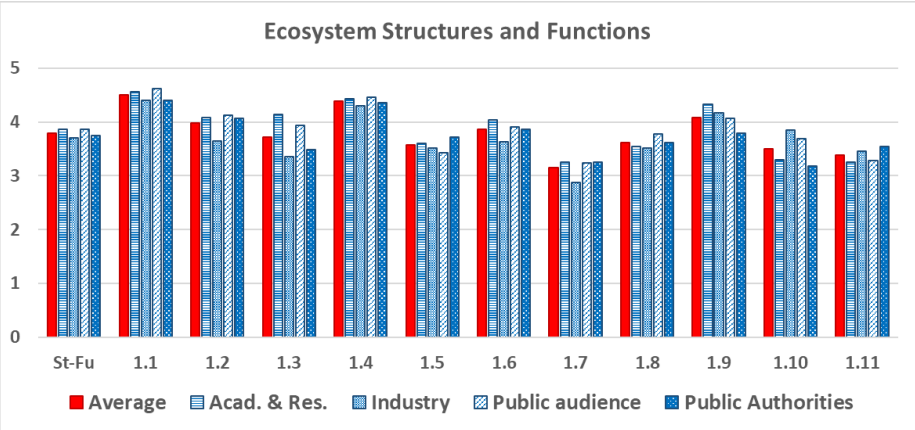



Figure 26. The importance of Ecosystem Structures and Functions in the research areas according the viewpoints of the stakeholders (averages per stakeholder category).

*3.3.2.2. Ecosystem Services*

The topic and question to the stakeholders was:
Ecosystem Services: What is the importance of the following variables in your coastal area?
The elements questioned are given in Table 11.

The general observations on the Ecosystem Services were (Figs. 27, 28):

- The elements received all-over Europe on average a moderate score (3.1 out of 5), yet with clear differences in the importance of the various elements.
- 'Biodiversity conservation', 'Education and Research', and 'Leisure activities' were judged of high importance (4 or higher out of 5), whereas 'Elements for aquaculture', 'Raw material', 'Provision of drugs and chemicals', and 'Spiritual significance' were judged relatively the least important (2.1 or lower).
- No consistent differences were found between stakeholders from different regions nor between the different categories of stakeholders

**Table 11**: Overview of the elements on Ecosystem Services questioned in the Stakeholder surveys

| **ES** | **Ecosystem Services** | |
|---|---|---|
| 2.1 | Biodiversity conservation | natural conservation of species, habitats, and genetic resources |
| 2.2 | Charismatic landscape | iconic scenery |
| 2.3 | Charismatic species | iconic plants, animals |
| 2.4 | Climate regulation | carbon sequestration, water retention |
| 2.5 | Education and research | oppertunities for education and research |
| 2.6 | Energy production | water, wind, solar, geothermal |
| 2.7 | Flood and coastal protection | deltas, marshes, dunes |
| 2.8 | Elements for aquaculture | Available nutrients and fodder for seafarming |
| 2.9 | Food provision for humans | opportunities for fishing, algae extraction |
| 2.10 | Leisure activities | opportunities for recreation, watersports, hunting |
| 2.11 | Pollination and dispersal of reproductive cells | seed dispersal, larval transport |
| 2.12 | Water regulation | fresh water, water storage, supply of drinking water |
| 2.13 | Raw material | opportunities to extract sand, gravel, shell, amber, salt. gas, oil |
| 2.14 | Provision of drugs and chemicals | Pharmaceuticals, medicine |
| 2.15 | Disease and pest control | controlling outbreaks. prevention of jellyfish blooms |
| 2.16 | Spiritual significance | religious and non religious value |
| 2.17 | Aesthetic significance | appreciation of natural surroundings, beauty of environment |
| 2.18 | Natural infrastructure | water routes, natural shipping lanes, transport facilitation |
| 2.19 | Waste and Toxicant mediation | wastewater treatment, preventing nutrient enrichment, denitrification |

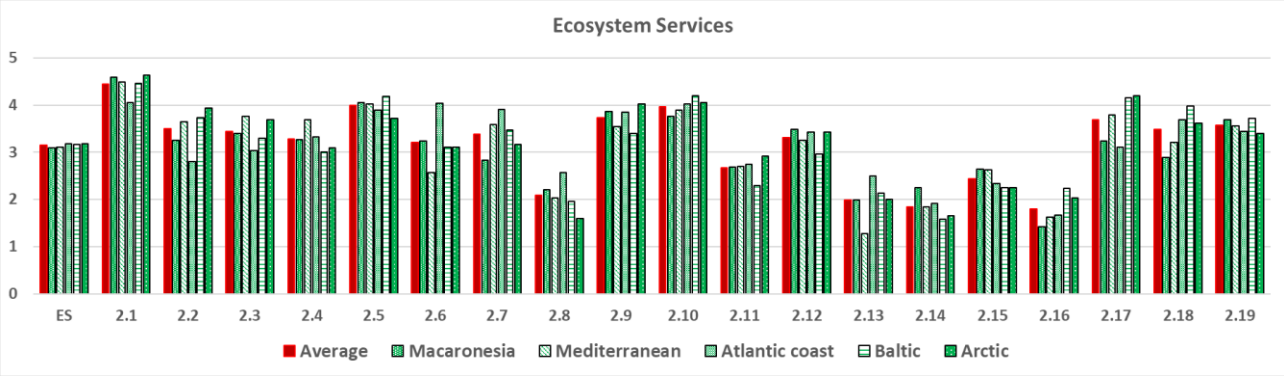



Figure 27. The importance of Ecosystem Services in the research areas according the viewpoints of the stakeholders (averages per region)

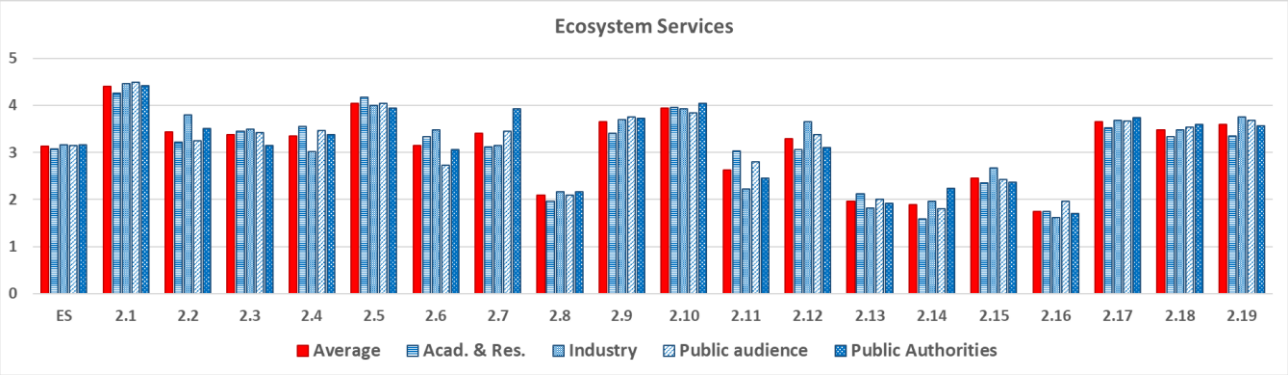



Figure 28. The importance of Ecosystem Services in the research areas according the viewpoints of the stakeholders (averages per stakeholder category).

#### *3.3.2.3. Socio-economic*

The topic and question to the stakeholders was:
Socio-economic: How strong is the relationship between the following variables and your coastal area?
The elements questioned are given in Table 12.

The general observations on the Socio-economic elements were (Figs. 29, 30):

- The elements received all-over Europe on average a moderate score (3.1 out of 5), yet with clear differences in the strength of the various elements.
- 'Domestic tourism', 'Foreign tourism', and 'Transport and infrastructure' were rated at a high level (4 or higher out of 5), whereas Emigration and Extraction of raw materials were judged to have the least strong relationshipl (2.1 or lower).
- No consistent differences were found between stakeholders from different regions nor between the different categories of stakeholders

**Table 12**: Overview of the Socio-economic elements questioned in the Stakeholder surveys

| So-Ec | Socio-economic | |
|---|---|---|
| 3.1 | Income | wage, payment, salary |
| 3.2 | Traditional livelihood | subsistence fishing, food-and resource collecting, handicrafts |
| 3.3 | Economic welfare | prosperity of area, wealth |
| 3.4 | Sustainability of economic prospects | future job security |
| 3.5 | Equal access to services, goods and benefits | fair distribution of resources and opportunities |
| 3.6 | Immigration | attracting permanent residents |
| 3.7 | Emigration | departure of permanent residents |
| 3.8 | Domestic tourism | tourists from own country, local recreation |

| | | |
|---|---|---|
| 3.9 | Foreign tourism | international, tourists from abroad |
| 3.10 | Trade | industry and commerce, fish auction and processing |
| 3.11 | Transport and infrastructure | port, ship traffic, ferries |
| 3.12 | Extraction of raw materials | sand, gravel, shell, amber, salt, gas, oil |
| 3.13 | Large scale fisheries | pelagic and benthic fishing, trawling |
| 3.14 | Small scale fishing | local artisanal fishing |
| 3.15 | Aqua-culture | clams, mussels, algae, seaweeds, farmed fish |
| 3.16 | Infrastructural buildings | Bridges, dams, dikes, roads |

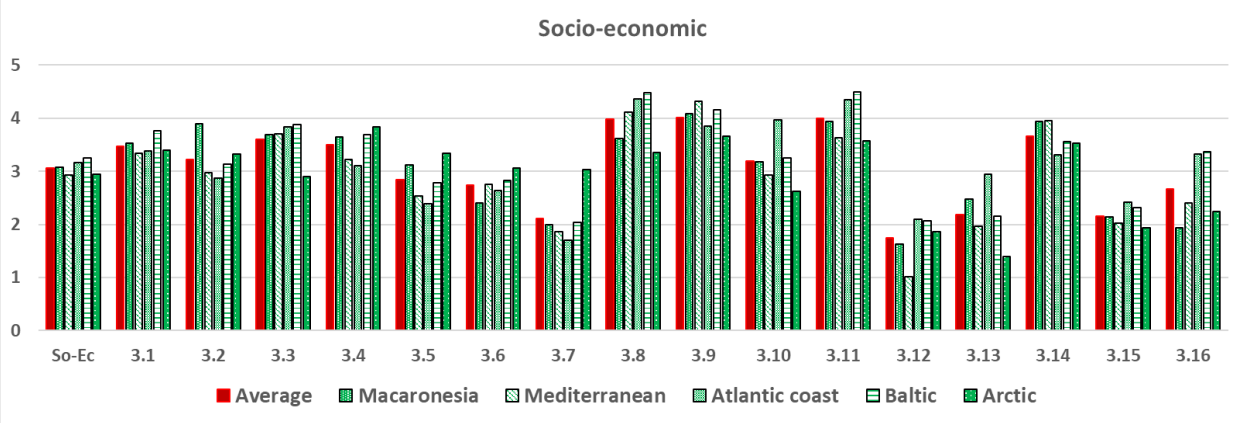



Figure 29. The strength of the relationship between the Socio-economic elements and the research areas according the viewpoints of the stakeholders (averages per region)

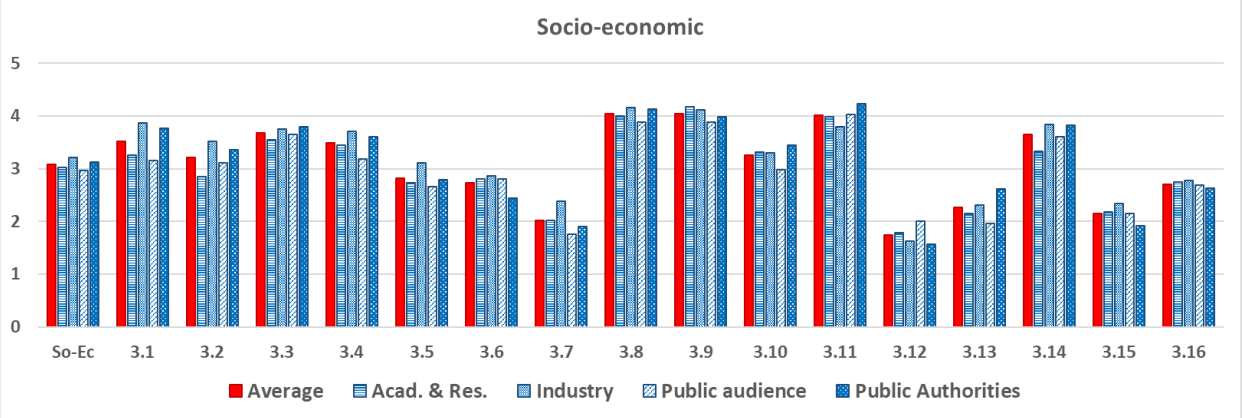



Figure 30. The strength of the relationship between Socio-economic elements and the research areas according the viewpoints of the stakeholders (averages per stakeholder category).

*3.3.2.4. Socio-cultural*

The topic and question to the stakeholders was:
Socio-cultural: How strong is the relationship between the following variables and your coastal area?
The elements questioned are given in Table 13.

The general observations on the Socio-cultural elements were (Figs. 31, 32):

- The elements received on average a rather high score (3.7 out of 5) all-over Europe.
- 'Sense of place', 'Relaxation', and 'Health' were rated to be at a high level (4 or higher out of 5), whereas no elements were judged to be at a low level.
- No consistent differences were found between stakeholders from most regions, though a lower score was found for a couple elements in the Arctic, such as 'Traditions', 'Cultural sites and monuments', 'Amusement', and especially a much lower score for 'Sports (only 2 out of 5)

- No consistent differences were found between the different categories of stakeholders.

**Table 13**: Overview of the Socio-cultural elements questioned in the Stakeholder surveys

| So-Cu | Socio-cultural | |
|---|---|---|
| 4.1 | Sense of community | social cohesion, positive interpersonal relationships |
| 4.2 | Traditions | traditional way of life, rituals or celebrations, folklore, dress, local language/dialect |
| 4.3 | Sence of place | attachment to local coastal environment, or to a specific coastal landmark/site |
| 4.4 | Cultural sites and monuments | historically significant architecture, lighthouses, shipwrecks |
| 4.5 | Sport | beach- and watersports |
| 4.6 | Relaxation | unwinding, peace of mind, rest, recovering |
| 4.7 | Amusement | fun, pastime |
| 4.8 | Awe | admiration, wonder, respect |
| 4.9 | Health | mental and physical well-being |
| 4.10 | Reflection | contemplation, inspiration |

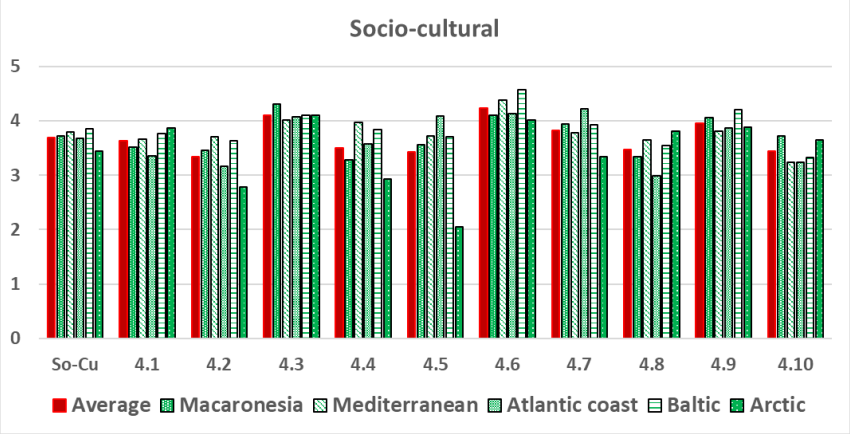



Figure 31. The strength of the relationship between the Socio-cultural elements and the research areas according the viewpoints of the stakeholders (averages per region)

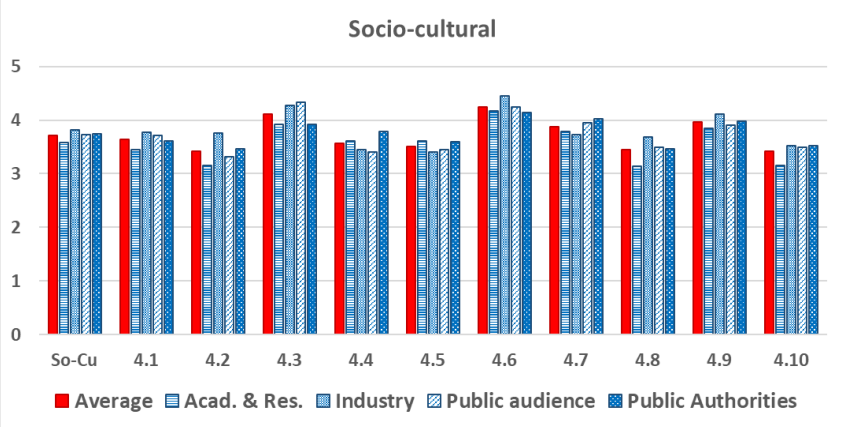



Figure 32. The strength of the relationship between Socio-cultural elements and the research areas according the viewpoints of the stakeholders (averages per stakeholder category).

*3.3.2.5. Governance*

The topics and questions were:
a) Governance (General Principles), and b) Governance – Rules and Regulations: To what extent are the following elements present in the governance in your coastal area ?
The elements questioned are given in Table 14.

The general observations on governance issues are (Figs. 33, 34):

- The stakeholders of all regions had in general the same perception on the extent of presence of all Governance elements – all over Europe the elements received an almost similar score (high or low), though with a few deviating trends (indicated in the following paragraphs).
- General principles of Governance received all-over Europe a moderate score (2.6 out of 5), whereas Rules and Regulations were judged to be somewhat stronger present in the Governance (3.5 out of 5). Except for the Climate goals that were judged to be less present in the governance (2.7 out of 5).

Observations with regard to regions are (Fig. 33):

- There is a considerable resemblance between different regions in scoring the strength of elements being present in the Governance, though there are some slight deviating trends regarding:
    - a couple of General principles of Governance elements (e.g. 'Transparency', 'Innovation', 'Accountability') that got a slightly higher score in Northern areas compared to Southern areas. 'Corruption' is an exception, because the trend was the opposite, it scored lower in the North.
    - the Rules and Regulations at the international and national level were slightly more important towards the North, whereas 'Local licenses and permits' were more important in the south.

Observations with regard to stakeholder categories are (Fig. 34):

- General principles of Governance as well as different levels of governance were both judged by the Public Authorities to have a stronger presence in the governance of their area than by the other stakeholder categories. Except with regard to 'Corruption' for which the trend is the opposite, Public Authorities judged it to be less present in their area.

Table 14: Overview of the Governance elements questioned in the Stakeholder surveys

| **Gov-GP** | **Governance (general principles)** | |
|---|---|---|
| 5a.1 | Inclusiveness | opportunities to participate in decision-making |
| 5a.2 | Transparency | visibility and verifiability of decision-making, provisioning of information |
| 5a.3 | Corruption | abuse of power, fraudulence |
| 5a.4 | Fairness | equal treatment, consistency of decision-making |
| 5a.5 | Advocacy | cooperation of government and sector |
| 5a.6 | Innovation | pilots, trials, new ideas |
| 5a.7 | Accountability | government officials are answerable, can be challenged |
| 5a.8 | Govermental resilience | ability/flexibility of government to respond to emergency or future changes |
| **Gov-RR** | **Governance - Rules and Regulations** | |
| 5b.1 | Local laws and regulations | rules and directives, emission quota at local level (city, district) |
| 5b.2 | National laws and regulations | rules and directives, emission quota at national level |
| 5b.3 | International laws and regulations | rules and directives at european and global level (EU, UNESCO, MSFD, GES), |
| 5b.4 | Local licenses and permits | requirements and permissions for activities and ventures from local authorities |
| 5b.5 | National licenses and permits | requirements and permissions for activities and ventures from national authorities |
| 5b.6 | Rules and regulations around Marine Protected Areas (MPA) | designated protected areas of the ocean, Natura 2000 |
| 5b.7 | Climate goals | Paris Agreement, Kyoto Protocol, reduction of emissions e.g. greenhouse gasses |

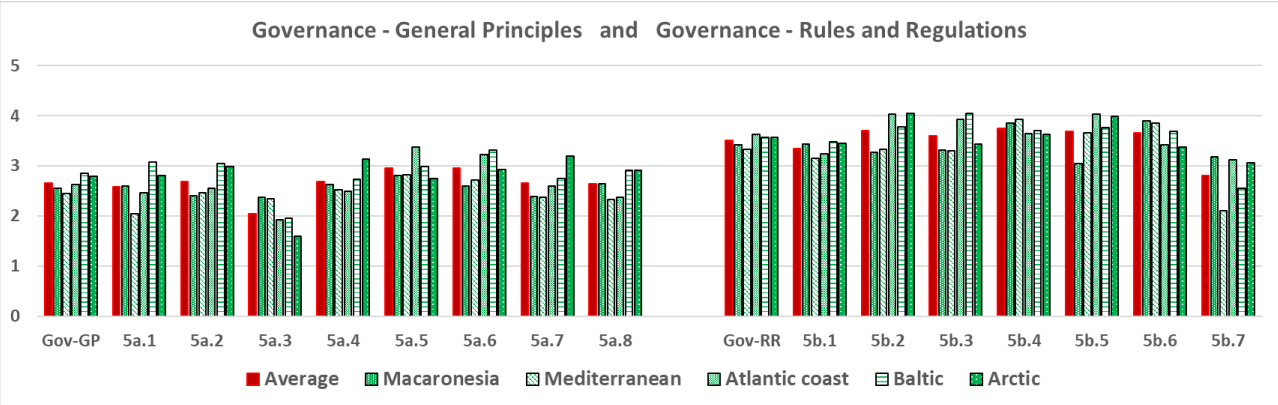



Figure 33. The strength of the presence of general principles and rules and regulation in the governance of the research areas according the viewpoints of the stakeholders (averages per region).

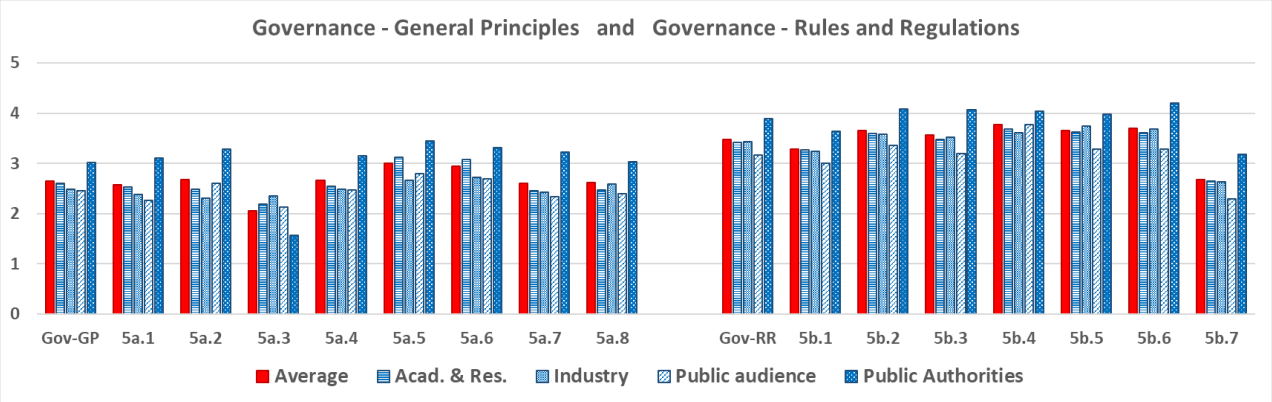



Figure 34. The strength of the presence of general principles and rules and regulation in the governance of the research areas according the viewpoints of the stakeholders (averages per stakeholder category).

*3.3.2.6. Pressures*

The topic and question was:
Pressures: To what extent are the following elements pressures in your coastal area ?
The elements questioned are given in Table 15.

The general observations on Pressures are (Figs. 35, 36):

- The stakeholders of all regions had in general the same perception of the extent of the strength of all Pressures – all Pressures do receive an almost similar high or low score all over Europe (with only a few deviating trends indicated in the following paragraph).
- Some pressures were judged to be present at a moderately high extent, such as 'Climate change', 'Change in species', 'Part-time resident', and 'Tourism' (3.4 to 3.7), whereas some scored on an average rather low: 'Outbreaks of pests and diseases', 'Civil engineering', and 'Sea mining' (2.0 or lower).

Observations with regard to regions are (Fig. 35):

- The category of Pressures had the highest differentiation between regions and stakeholder of all categories of elements.
    - There was mainly a deviating pattern for the Arctic. The perception on the extent of the strength of pressures was in the Arctic in general considerably lower than in the other regions.
    - Several pressures were ranked slightly higher along the Atlantic coast and in the Baltic, such as 'High population density' and 'Pollution'.

- The strongest contrast can be found between the Baltic (rather high pressure from Outbreaks of pests and diseases, and Eutrophication) and the Arctic (low pressure).

Observations with regard to stakeholder categories are (Fig. 36):

- Though most categories of stakeholders ranked the pressures equally, it is the Public Audience that scored several Pressures at a higher level, such as 'Eutrophication', 'Change in species', 'Climate / Global change', 'High population density', 'Pollution' and 'Habitat loss'.

Table 15: Overview of the Pressures questioned in the Stakeholder surveys

| **Pres** | **Pressures** | |
|---|---|---|
| 6.1 | Outbreaks of pests and diseases | avian flu, fish cancer, toxic algae blooms |
| 6.2 | Extreme weather | flooding, storm surges, mudslides, local extreme rainfall/droughts, wildfire |
| 6.3 | Eutrophication | enrichment in nutrients of the soil or waterbody |
| 6.4 | Change in species | plants and animals appearing and disappearing, invasive species |
| 6.5 | Climate / Global change | temperature rise, rising sea-levels, acidification, deoxygenation |
| 6.6 | Illegal human activities | poaching, illegal dumping, illegal contructions |
| 6.7 | Mismanagement | lack of responsiveness, enforcement, and acknowledgement |
| 6.8 | Change in land/sea use | expanding the area for aquaculture or ports |
| 6.9 | High population density | overcrowding, overuse |
| 6.10 | Civil engineering | impact caused by bridges, windmills, dikes |
| 6.11 | Public opinion | activism, media |
| 6.12 | Pollution | waste water, aerial depositions, toxins, chemicals, hormones |
| 6.13 | Local human disturbances | littering, light, vibration, noise |
| 6.14 | Large-scale disturbances | drilling, dredging, light, noise by maritime shipping |
| 6.15 | Neglect of maintenance | lack of conservation and support |
| 6.16 | Part-time residency | seasonal tourism, peak loads, competition on housing market |
| 6.17 | Tourism | recreation, visitors, travelers |
| 6.18 | Sea mining | extraction of sand, gravel, gas, oil |
| 6.19 | Overfishing and overexploitation | unsustainable fishing, depletion of fish, sea mammals and aquatic plants stocks |
| 6.20 | Urbanization | expansion of housing and infrastructure in outer territories |
| 6.21 | Habitat loss | habitat fragmentation, loss of connectivity, reduction of salt-marshes |
| 6.22 | Horizon disturbance | Visual ruining, skyline destruction, wind-mills and high-rise buildings |

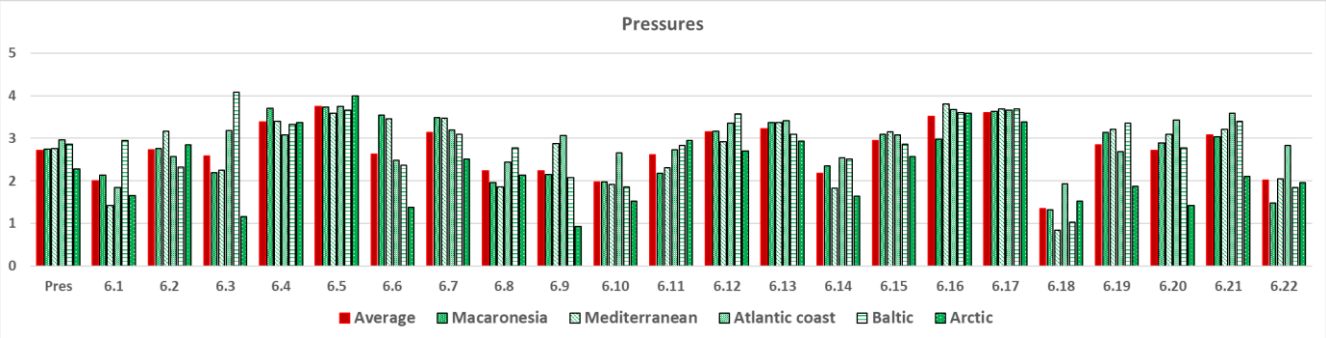



Figure 35. The extent of pressures in the research areas according the viewpoints of the stakeholders (averages per region)

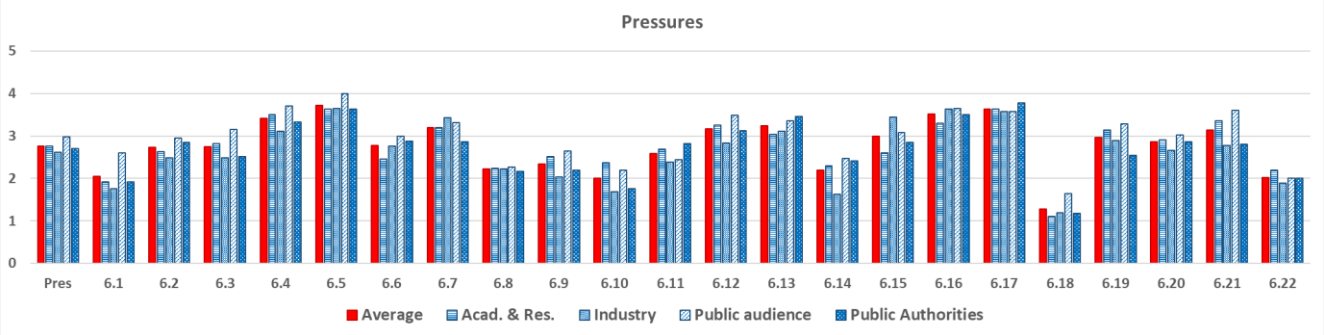


Figure 36. The extent of pressures in the research areas according the viewpoints of the stakeholders (averages per stakeholder category)

### *3.3.3. Apparent low level of variation in stakeholder perceptions, and some exceptions*

In the previous chapter (3.3.2) very often the detailed results indicated that the stakeholders of all regions and of all stakeholder categories do have a similar perception on the importance, strength, or extent of presence, for the various elements in the survey, i.e. the elements were given almost the same high or low score.
Nevertheless, some variation can be observed at more detailed observation (which we discuss in this chapter), and further by applying a statistical cluster analyses (discussed in chapter 3.3.4).

In this chapter we present a kind of 'bird's eye' overview to see whether there is indeed an overall absence of variation, i.e. is there a high similarity, in the perception of stakeholders in the various regions and among all stakeholder categories, or whether there are distinctive deviating trends. To this end, the averages of all surveys per region (including the overall average) are depicted directly below each other (Fig. 37) as is done also per stakeholder category (Fig. 38).

A remarkable similarity comes to the foreground in either way the data are depicted, per region or per stakeholder category. Elements evaluated at a higher level are judged at a relatively high level all over Europe, and among all stakeholder categories. The same holds for elements perceived to be of a lower importance or strength.

Only very few deviating trends from this pattern come to the foreground, being:

- Public Authorities scored Governance issues at a higher level than other stakeholders (Fig. 37, second to last panel).
- Several elements of the category Socio-economic, Socio-cultural elements and Pressures that were given a high score in most regions received a considerably lower score in the Arctic. Thereby the graph for the Arctic appears lowered (Fig. 38, lowest panel).

When focussing on the degree of the differences that constitute the above deviations, most of these differences have a score-difference less than 1 in the importance or strength of the element.
In fact all differences in scores related to the comparison of various stakeholder categories (Fig. 37) are below 1, even when considering the maximal average minus the minimal average of a stakeholder category.

Only a few deviations related to comparison of the various regions (Fig. 38) are considerable with a significant score-difference of 1.5 between at least two regions (adopting a significance level of p=0.01, average maximum standard error of 0.25, and average 50 degrees of freedom).
The elements that showed such a firm significant difference between regions are mainly linked to:
- 1) lower scores in the Arctic (Fig. 39), versus higher scores:
  - 1.a) in the South of Europe for the pressures of 'Illegal activities',
  - 1.b) in the South and Middle of Europe for the economic 'Large-scale fisheries', the socio-cultural 'Sport', and the pressures of 'High population densities' and 'Urbanisation',
- 2) a higher score in the Baltic:
  - for 'Eutrophication' and 'Outbreaks of pests and diseases'.

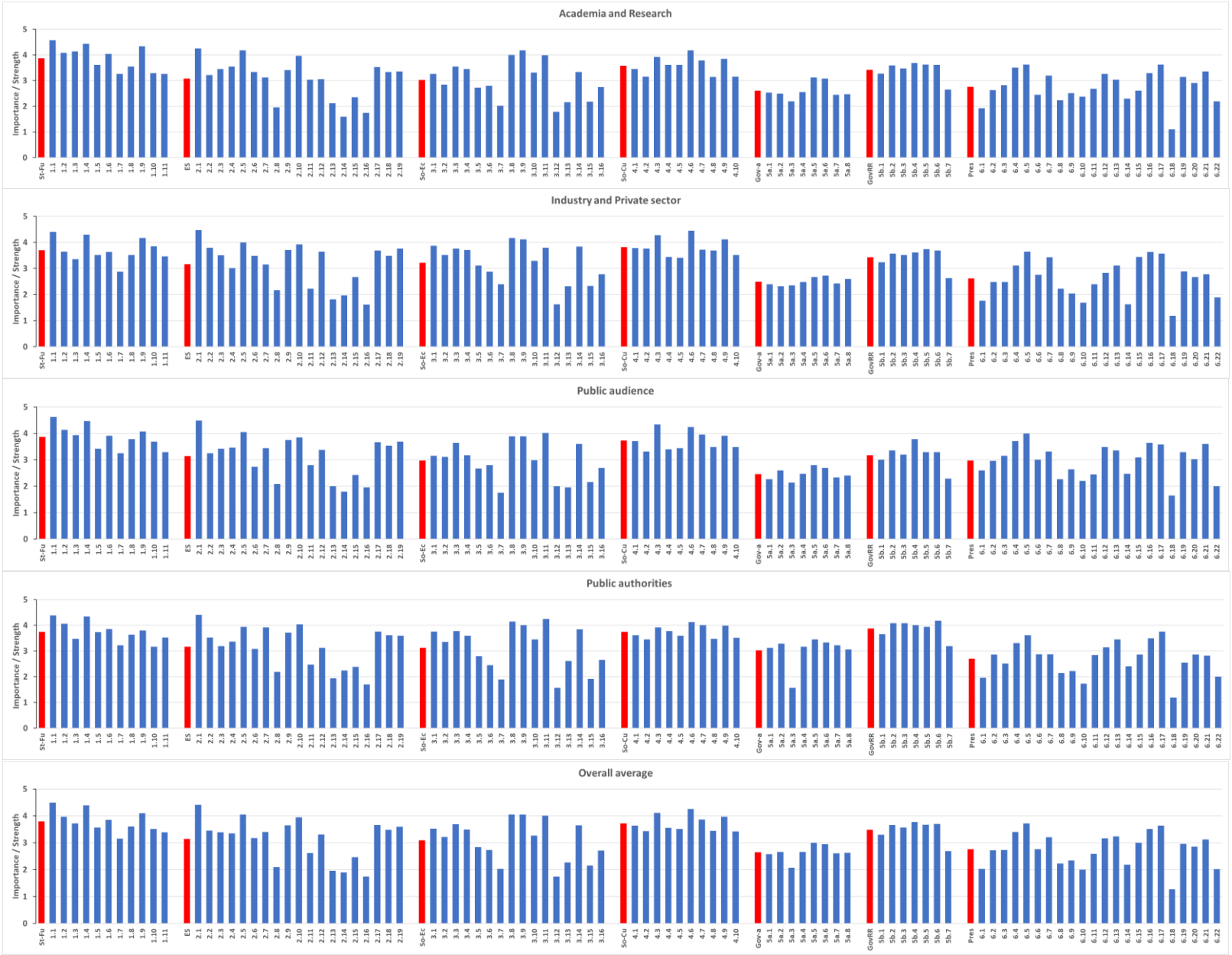



Figure 37. Average importance/strength of the elements per stakeholder category (top 4 graphs) and overall (lowest graph) (blue columns = average over all research areas per element, red columns = overall average for all research areas per element category; St-Fu = Ecosystem functions and structures, ES = Ecosystem services, So-Ec = Socio-economic aspects, So-Cu = Socio-cultural aspects, Gov a = Governance (general principles), GovRR = Governance: Rules and Regulations, Pres = Pressures; all numbers refer to the numbered elements in Appendix 6).

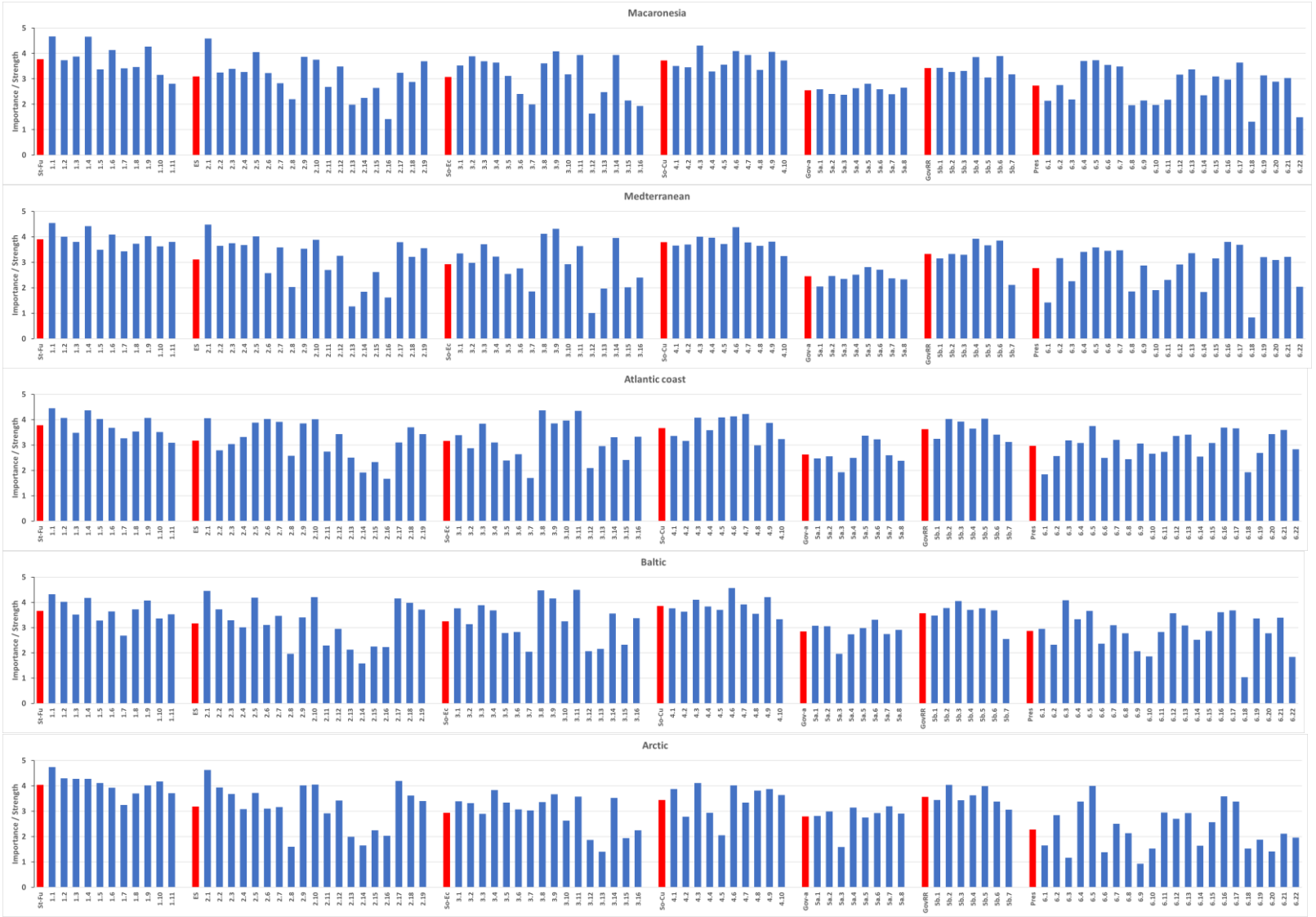



Figure 38. Average importance/strength of the elements per region (blue columns = average over all stakeholder categories per element, red columns = overall average for all stakeholder categories per element category; St-Fu = Ecosystem functions and structures, ES = Ecosystem services, So-Ec = Socio-economic aspects, So-Cu = Socio-cultural aspects, Gov a = Governance (general principles), GovRR = Governance: Rules and Regulations, Pres = Pressures; all numbers refer to the numbered elements in Appendix 6).

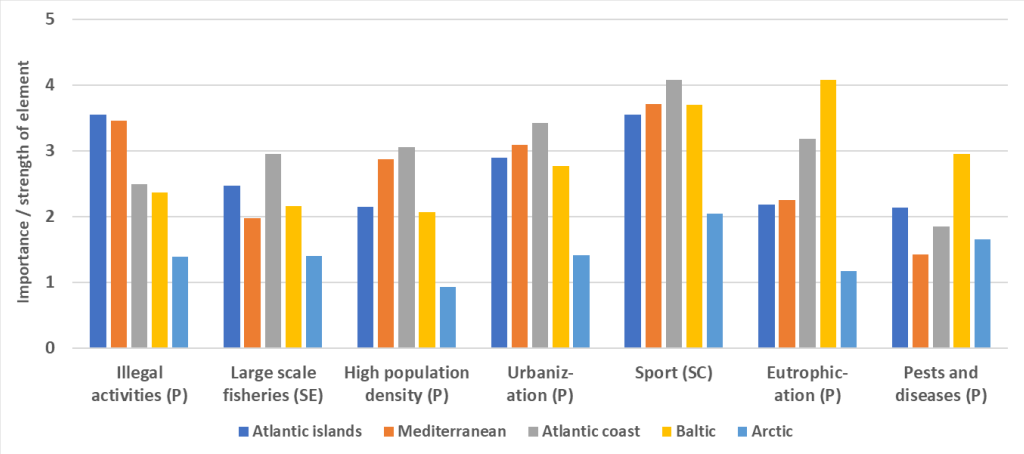



Figure 39. Average importance/strength of the elements that showed significant differences between the scores of at least per region (averages of all stakeholders per region per element; difference in the scores has to be at least 1.5, based on the average maximum standard error of 0.25, significance tested with p=0.01, and 50 degrees of freedom) (P= Pressure, SE= Socio-economic element, SC= Socio-cultural element)

### *3.3.4. Cluster analysis of variation in survey results*

The Principle Component Analysis (PCA) of the survey data (Fig. 40), and the Heatmap (Fig. 41), indicated three major groups, being the 1) the Arctic as a distinctive region, 2) the Baltic and Atlantic coast, and 3) the southern regions Mediterranean and Macaronesia.

No distinctive pattern for the different stakeholder categories could be found. As a remarkable exception, in the heatmap, the stakeholder group of "Public Authorities" in Macaronesia fell within the regional groups of the Baltic Atlantic Coast (Fig. 41).

From the Heatmap (Fig. 41) it becomes clear that, regarding the Arctic, the differentiation is mainly related to higher or lower ranking of the importance of elements from the categories:
- Pressures (6.3 Eutrophication, 6.6 Illegal human activities, 6.7 Mismanagement, 6.9 High population density, 6.17 Tourism, 6.19 Overfishing and overexploitation, 6.20 Urbanization, 6.22 Horizon disturbance),
- Socio-economics and Ecosystem Services (2.8 & 3.15 Aquaculture, 2.13 Raw Material, 3.8 Domestic tourism, 3.13 Large scale fisheries), and
- Socio-cultural (4.2 Traditions, 4.4 Cultural sites and monuments, 4.5 Sport).

The elements presented in Figure 39 in the previous chapter 3.3.3 are almost all again represented in this listing too.

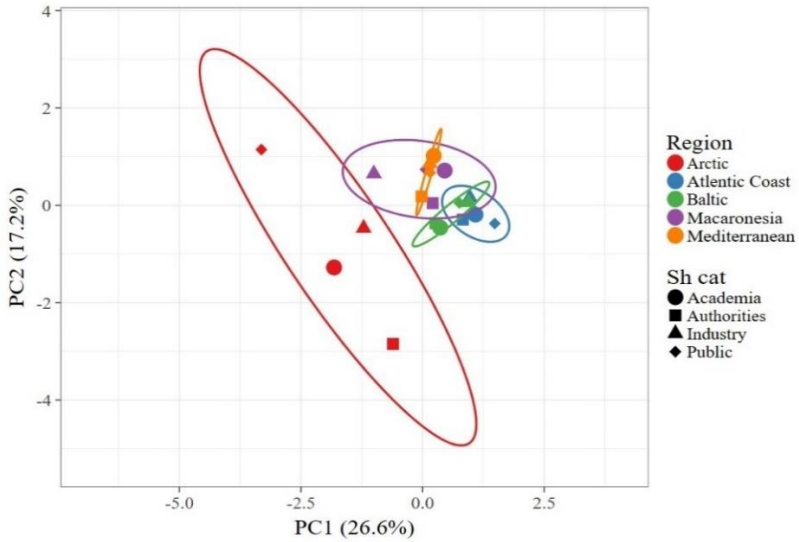



Figure 40. Principle Component Analysis (PCA) on the survey results. Original values are ln(x + 1)-transformed (to omit problems with zero ("0") entries). Columns with similar annotations are collapsed by taking median inside each group. No scaling is applied to rows; SVD with imputation is used to calculate principal components. X and Y axis show principal component 1 and principal component 2 that explain 26.6% and 17.2% of the total variance, respectively. Prediction ellipses are such that with probability 0.95, a new observation from the same group will fall inside the ellipse. N = 20 data points.

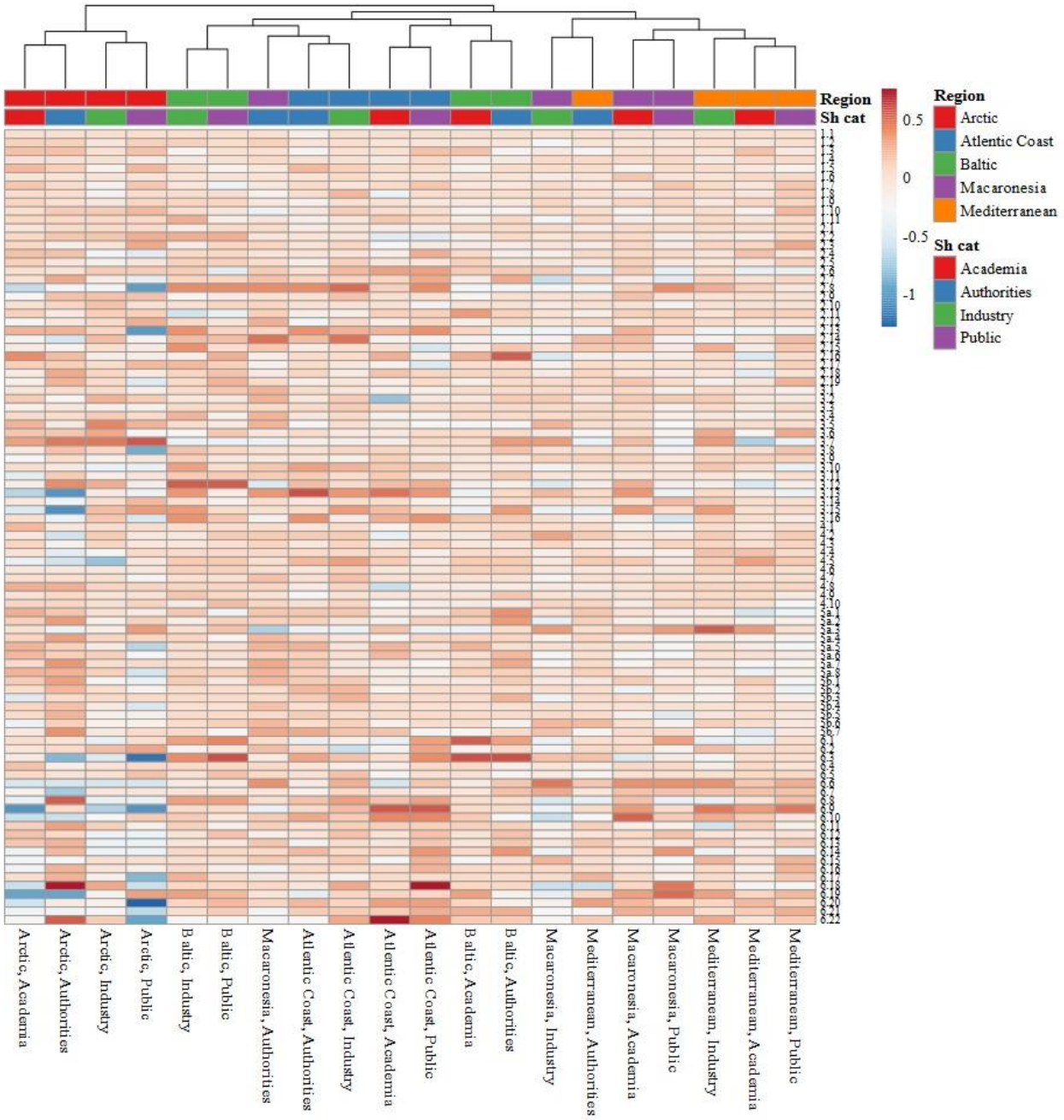



Figure 41. Heatmap of the survey results. Original values are ln(x + 1)-transformed. Columns with similar annotations are collapsed by taking median inside each group. Rows are centered; no scaling is applied to rows, and Columns are clustered using correlation distance and average linkage (93 rows, 20 columns). Numbers along the right side of the graph represent the elements following the order in Appendix 6.

### *3.3.5. Summary of elements with highest and lowest importance in surveys*

From the surveys a small series of elements came to the foreground that were perceived in almost all regions and among all stakeholder categories as most important or with the highest, strength (Table 16). These most important elements were selected on basis of an average score of 3.9 or higher. Similarly a small series of elements of the least importance or lowest strength can be indicated, such on basis of a score of 2.0 or lower.

The most important elements can be judged as essential elements to be taken into account for management and decision making regarding the coastal zone.

The elements found the most important in the surveys do match with elements being important in interviews too. Only 'Resilience', 'Nutrient cycle' and 'Sense of place' were hardly mentioned in the interviews, though 'Sense of community and Identity' was rather often mentioned in the Finnish Archipelago.
The elements being the least important in the surveys, were also hardly mentioned in the interviews.

Table 16: The survey elements that were perceived by the Stakeholders as those most important or strongest present (overall average score 3.9 or higher), and those least important or least present (score 2.0 or lower) in the coastal research areas

| **Most important elements** | | | | **Least important elements** | | |
|---|---|---|---|---|---|---|
| **Element Nr.** | **Category** Element | **Importance Strength** | | **Element Nr.** | **Category** Element | **Importance Strength** |
| | | | | | | |
| **St-Fu** | **Ecosystem Structure and Functions** | **3.79** | | | | |
| 1.1 | Biodiversity | 4.49 | | | | |
| 1.4 | Habitats | 4.38 | | | | |
| 1.9 | Resilience | 4.10 | | | | |
| 1.2 | Nutrient cycle | 3.97 | | | | |
| **ES** | **Ecosystem Services** | **3.14** | | **ES** | **Ecosystem Services** | **3.14** |
| 2.1 | Biodiversity conservation | 4.40 | | 2.16 | Spiritual significance | 1.74 |
| 2.5 | Education and research | 4.04 | | 2.14 | Provision drugs & chemicals | 1.90 |
| 2.10 | Leisure activities | 3.94 | | 2.13 | Raw material | 1.96 |
| **So-Ec** | **Socio-economic** | **3.09** | | **So-Ec** | **Socio-economic** | **3.09** |
| 3.8 | Domestic tourism | 4.06 | | 3.12 | Extraction of raw materials | 1.74 |
| 3.9 | Foreign tourism | 4.05 | | | | |
| 3.11 | Transport and infrastructure | 4.01 | | | | |
| | | | | | | |
| **So-Cu** | **Socio-cultural** | **3.72** | | | | |
| 4.6 | Relaxation | 4.25 | | | | |
| 4.3 | Sence of place | 4.11 | | | | |
| 4.9 | Health | 3.96 | | | | |
| | | | | | | |
| | | | | **Pres** | **Pressures** | **2.76** |
| | | | | 6.18 | Sea mining | 1.27 |
| | | | | 6.10 | Civil engineering | 1.99 |

## 3.4. Additional Surveys on Biodiversity, Management, Tools and Governance

The questions and answers to the Additional Survey were divided in 3 major groups, those: 1) related to the Management of the environment in the case-research area, 2) related to the tools used and to develop in an area, and 3) focusing on the governance, rules and regulations in an area. Some questions did relate less to the original division in 3 groups and were repositioned (e.g. on Natural Capital Accounting moved from Management to Tools) or are treated below in a separate paragraph (Biodiversity and Marine Protected Areas in chapter 3.4.4).

This analysis is derived from a total of 10 completed surveys, 2 of which were submitted by stakeholders in the Marine SABRES project, and 8 of which were submitted by stakeholders in the MARBEFES project. Therefore, in almost all responses there is a rather high variation due to the geographic location of respondents. Nonetheless, the major trends and common themes appearing from the responses to the surveys are given below. Details of all questions and answers are given in Appendix 7.

### 3.4.1. Management

With regard to the question whether “Would you change the (environmental) management of this area? If so, how and why” (appendix 7: question 2) only 1 stakeholder (in Madeira) indicated that in their area the management is adequate. Among the other stakeholders several reoccurring themes came to the foreground, being:
- 1) improved management planning and monitoring: There is a call for a more adequate and consistent management and monitoring.
- 2) improved collaboration and coordination. Clearly, stakeholders argue that governance bodies and government agencies should communicate more and improve their coordination.

Barriers mentioned for such improvements are lack of funding and lack of personnel.
Yet as can be abstracted also from the question “Why do you think the management you suggest has not been implemented yet”’ (appendix 7: question 3) some other barriers are apparent, being:
1) a lack of political will to make impactful decisions, underpinned by political and financial reasons,
2) and that most MPAs are relatively young and have not advanced yet to a more advanced level of management and planning.

An issue may also be that as most stakeholders indicate there are clear differing views between different interest (stakeholder) groups. Such became clear from the answers on the question “Are there divergent opinions between interest groups (e.g. different stakeholders, users, the public etc.) about the management of the area” (appendix 7: question 4) to which almost all answered a clear "Yes".

### 3.4.2. Tools

The use of several tools that were questioned are hardly known or not at all used by most stakeholders. This holds for:
- Natural Capital Accounting (NCA) (appendix 7: question 5). In general, the stakeholders are either unaware of NCA being present, or indicate NCA is absent.
- Decision-Support Tools (DSS) (appendix 7: question 6, 7, 8, 20). Though in first instance half the stakeholders indicate they use a DSS (question 6), the tools they mention are merely supportive tools to find information or calculation tools (question 7, 8). Moreover, in view of the overall negative responses to question 20 (do you use a DSS system) the conclusion has to be that a full DSS is not in use among the majority of the stakeholders
- Ecosystem Services concept (ESC) (appendix 7: question 21). None of the stakeholders is using any type of ESC at this moment.

Regarding the question “What tools that help to address welfare or environmental and socio-economic issues are developed for your area” (appendix 7: question 9) only a few stakeholders indicate a couple of tools, such as Marine Spatial Planning.
The stakeholders indicate (in reply to questions 9a and 9b) that these tools may help: 1) to narrow down uncertainties, 2) to solve the lack of data, 3) to assess a specific problem, 4) for communication with stakeholders and public, and 5) to solve the conflicts between usage of an area.

In reply to the question whether “In your opinion, are there key gaps where a new tool is necessary” no key-gaps where new tools should be required were indicated.

### 3.4.3. Governance, Rules and Regulations

A wide range of rules and regulations acting in the DAs and BBTS are mentioned to the question on “What are the main regulations (global, EU, regional, national, local) that you are faced with that

influence your work (decision making, planning, target setting, stakeholder engagement, etc.)" (appendix 7: question 11).

Most often international rules are indicated to have the strongest influence, followed by a high diversity of national, regional and local rules (for details see Appendix 7).

The most often mentioned international rules are the Habitats and Birds Directives (H&BD), Natura 2000, Marine Strategy Framework Directive (MSFD), Water Framework Directive (WFD), Maritime Spatial Planning directive (MSP), Climate regulations (CR), and the Common Fisheries Policy (CFP).

The operationality and functionality of those rules and regulations (appendix 7: question 12) varied strongly. For the international rules the rating (ranging from 0 for poor to 5 for great) ranged on an average from rather good (4) for the MSFD, CR and WFD, through 3.5 for MSP and 3 for the H&BD, to poor (1) for the CFP.

With regard to Biodiversity and Ecosystem Services (ES) the most important rules and regulations mentioned by stakeholders are the H&BD, Natura 2000, WFD, and MSFD (appendix 7: question 13), with a similar rating for their operationality and functionality as given before (appendix 7: question 14).
The stakeholders are not aware of any further *additional* European, national, regional and local rules and regulations that concern the governance and management of biodiversity and ES (appendix 7: question 19), except of one stakeholder indicating the CBD and Aichi target.

The primary governing bodies (institutions, agencies, etc.) and other actors (research community, civil society) that are important for the stakeholders regarding contacts and their work (appendix 7: question 17) are very divers and area-specific. Very few similarities can be found since mostly specific local, regional, and national governing bodies are indicated.
Irrespective the high diversity of the primary governing bodies the stakeholders interrelate with those governing bodies primarily for information and as expertise providers for e.g. policy, and for educational and research issues (appendix 7: question 18)

#### *3.4.4. Biodiversity and Marine Protected Areas*

Regarding the question "Which are the most relevant threats/problems for marine biodiversity in your area" (appendix 7: question 1) the common concerns expressed across several regions are: 1) climate change, 2) overfishing, 3) eutrophication, 4) invasive species, and 5) habitat loss.

The majority of the stakeholders is working with MPA's (60 %; appendix 7: question 22) and concerned about the MPAs (80 %; appendix 7: question 23).

The issues the stakeholders feel as the main challenges with regard to MPAs (appendix 7: question 24).are:
1) identification and implementation of MPA's
2) lack of an effective management thereby leading to "paper parks"
3) increasing the level of protection
4) control and enforcement in already established MPA
5) overlap with human activities that impact the MPA
6) multiple clashing interests
7) lack of political willingness and slow policy and management development.

## 3.5. Impressions

Before and after the interviews and surveys the stakeholders often gave broad impressions on their professional and social environment. These impressions may substantiate or supplement the other results. In this chapter we present some of these impressions. Yet, we should keep in mind that due to the character of the process of collection, these impressions are to be regarded merely as storylines than as hard facts.

Canary islands
Fishermen indicated the importance of artisanal fishing and the traditions in the villages connected to fisheries. Mass-tourism was mentioned frequently, and with climate change, it is seen as one of the major pressures on the island.
The archipelago has an autonomous status under the Spanish crown, and this may have an impact on local governmental issues.

Madeira
Nature conservation, Madeira's nature, and the Mass tourism were central themes on the main island and the smaller island Porto Santo, north east from Madeira. All appreciated the seemingly unlimited potential of the island's nature. With specific ecological habitats and waters rich in sea life, Madeira is a hot spot for tourism. Stakeholders also often mentioned the importance of 'diversification' in the touristic sector, thereby reducing the disturbance of marine life, and promoting tourism on land.

The Azores
Because whales are present only a limited time per year, and 'whale-tourists' visit the islands only a restricted period of the year, seasonality poses quite some problems for several stakeholders. Because of the climate of the islands the perfect tourism season is only 3 months long. Due to climate change, the stakeholders see a shift in the touristic season from summer to later in the year. This shift in seasons has economic implications for many island residents.
The waters around the Azores are rich in different whale species and these are major selling point for the diving industry, so, protecting marine sea-life was a topic raised often.

Crete - Gulf of Heraklion
The stakeholders indicated often that the coastal development on the northern shoreline is very high and is considered a pressure on the system. To control the risks and pressures stemming from coastal development, there should be an improvement of the supervision of these developments. There is a need for a stronger governance to ensure a development of economic sectors without rising risks.
Mass-tourism is very strongly present across the northern shore, and often negative connotations are present about the pressures given by this mass tourism.
Moreover, there is a lack of awareness and knowledge of the ecosystem on Crete. This could be improved by educating the residents.

Sardinia
The diversification of the local fisheries industry (inclusion of other species, processing fish to alternative products), and the development of recreational activities towards ecotourism came to the foreground.
For the fisheries, as well for the recreational activities, the balance, and uncertainties, with regard to the zonation and management of protected areas (who is allowed to be active where and where not) were frequently mentioned.

Tuscan archipelago

Stakeholders in the Tuscan archipelago expressed their concern on vagueness of the zonation of protected areas. This creates difficulties for the fisheries and tourism industry to select the areas for their activities. The governance of their region might focus more on a consistent policy regarding this issue.

Mallorca - Balearic archipelago

Mass tourism was noted frequently by stakeholders. They emphasized the need for regulation of the tourism industry and its associated risks (pressure on nature, but also prices of housing).
Stakeholders emphasized the need to preserve Mallorca's ecosystems, such as its coastline, marine life, and biodiversity. Posidonia in particular, also known as seagrass, was often mentioned by stakeholders to illustrate the difficulties when trying to balance economic development (including tourism) with ecological sustainability.
These issues of environmental conservation were often discussed in the larger societal context of a lack of awareness and knowledge among the general population regarding the coastal ecosystem in Mallorca. Some stakeholders emphasized the importance of implementing educational initiatives, advocating for more 'promotion' of nature and sustainability in general, and for sustainable fishing practices in particular.

Bay of Biscay

Several stakeholders were familiar with the term 'blue economy' and indicated the need to balance such with sustainability issues.

Belgium - Doggerbank

'Governmental frustration' was a much raised topic. Besides this concern, climate change and urban development, because of the high density of touristic residencies and the growing industry along the harbour of Oostende, were mentioned often.

Dublin – Liverpool – Irish Sea

Dublin: The two main pillars of Dublin Bay are recreation for the people of Dublin on the one hand, and habitat for migratory birds on the other. Both compete for space in Dublin Bay. Recreation provides opportunities on the one hand, but is also a pressure on the other. Furthermore a lack of implementation of transboundary marine planning in the Irish Sea was heard.
Liverpool: There is a lack of knowledge and awareness on the ecosystem surrounding Liverpool. People say they live by the river, although the coast is near and the Mersey is a tidal river. The general idea in the population is that there is no life underwater and the Irish Sea is muddy and filthy. Because of the high population density there are numerous conflicts between industry, recreation and nature preservation.

Gdansk Bay

The seasonal influx of tourists creates, according to the stakeholders, a strong pressure on the ecosystem. Especially domestic tourists that flock in this area every year in the summer contribute to this pressure. The need for awareness-raising campaigns among the society was mentioned to create more awareness for environmental protection and conservation.
Stakeholders indicated the poor quality of the Gdansk Bay in terms of water and air quality.
Remarkable was how careful people were to speak openly about governance, rules and regulations. The topic was hardly brought forward in the interviews with the stakeholders.

Curonian Lagoon

The relation with Russia came frequently to the foreground. Since the lagoon and spit are shared between Lithuania and Russia there are problems with cooperation and control. Furthermore, it was exceptional to hear that stakeholders do not worry too much about climate change. They would like their winter to be less cold. But the frequency and intensity of storms is a concern to them, as well as algal blooms and exotic species.

Finnish archipelago

Often problems that may arise for local communities (sense of community) came to the foreground because of a high(er) amount of seasonal recreational activities (domestic and touristic). Creating awareness on a balanced view between society and (a highly valued) nature was often emphasised, including the pressures that are of terrestrial origin (by agriculture, industry) or by marine traffic. To this end, education, cooperation with the university, and a stronger involvement of stakeholders in decision making were wished for.

Porsangerfjord

Stakeholders would like to profit more from the slowly upcoming tourism. Large-scale tourism is not an issue at all. Stakeholders are very much aware of their bond with nature and they consider 'Nature Conservation' as very important.

The community here stood out from the other research areas because of the indigenous societies present here. They especially are very bonded to the North Norwegian habitat and life with the seasons. The indigenous stakeholders often mentioned the importance of 'Education' and the survival of 'Traditions and Cultural Heritage'.

In general, stakeholders in this research area do not feel heard by the national government. They live very high up north and a lot of rules and regulations, regarding fishing and hunting, apply for a more southern climate, since the government of hunting and fishing is based in Trondheim and Oslo. This topic together with Climate Change causes most of the worries and frictions in this area.

Svalbard

On Svalbard the society is not comparable to the other societies being studied in these two projects. There are no residents that live here who need elderly- or special care. Due to the temporary residence of the inhabitants, there are no long-running traditions or folklores that are passed down to the next generation.

All the information on the island, from the status of the glaciers to the population of the animal species and the political and social issues are shared upon by almost all residents on the island. There are no strong outstanding or unpopular opinions, which makes the multicultural society very accessible, responsive and clear on their points of views and opinions.

# 4. Discussion and Conclusions

## 4.1. General

In this study thanks to 231 voluntary cooperating stakeholders a valuable set of 193 interviews and 198 surveys could be obtained. The methods used, centered around a kind of “card-games”, met great enthousiasm, and this may have been the reason that no stakeholder fatigue was observed during the whole period of stakeholder engagements.

The 4 major categories of stakeholders, public audience, public authorities, academics, and industry were all over equally distributed. Yet, at some areas a specific category could be over- or under-represented or even absent. At hind-sight this needs not to be worrying since the first comparisons and statistical analyses indicated that there are in general no differences in responses between the categories of stakeholders.

At the other hand clear differences in responses can be found between regions, often with distinct changes along a north-south gradient on how important or how strongly present some elements are perceived by stakeholders in their coastal area. These differences are summarised in the following chapters.

The number of harmonised elements mentioned by stakeholders did not exceed 92, which is almost equal to the number of elements , i.e. 93, used for the surveys. Moreover, all most important elements of the surveys are also among the elements mentioned in the interviews. The list of elements in the surveys was devised in cooperation with the scientists involved in the projects, whereas the elements in the interviews were thought over by stakeholders. This means that there is in this study a good comparison between the academic reflections and the common sense of practitioners. Such is a good foundation to compose in the projects on basis of the results from interviews and surveys relevant and practical tools and instruments that may help for a better management and decision making in the coastal zone.

## 4.2. Interviews

Though in total 92 elements were mentioned during all the interviews, only 5 of them are mentioned as being everywhere highly important, belonging to the Ecological, Economic and Pressures category. Of them Nature, Biodiversity, and Economy are primarily sending elements that have a positive, i.e. strengthening, influence on other elements. Large-scale tourism is sending as well as receiving, and can have a positive influence on economy, yet has on an average more negative influences on other elements as the society. Pollution is a strongly sending element with a negative influence on others.

Of a more moderate importance, though also all over Europe, the stakeholders still mentioned elements that mainly belong to the Socio-cultural (e.g. education, awareness), Governance (from local to international governance), and Pressure category (Disturbance, Littering, Overexploitation) – not highly important but present everywhere.

These results make clear that in the perception of the stakeholders the nature and economy come first together with pressures by pollution, yet that the social-cultural and governmental issues come second. Nevertheless, because of still being evaluated as important by stakeholders all over Europe, in order to achieve a bottom-up supported management and decision-making, also these element should be taken into account in further steps within the projects for development of tools and instruments.

In the interviews most of the important elements, up to 70 %, do show a geographic north-south gradient in the level of importance or their strength in the coastal zone. Clearly the southern regions (Macaronesia, Mediterranean), the middle of Europe (Atlantic Coast, Baltic), and northern region (Arctic) do differ with regard to the viewpoints of the stakeholders on what is important in the regional balance between nature, socio-economy and the pressures acting on it.
This may be a reason for an explicit differentiation of the tools and instruments to be developed for each region. Therefore a short summary is presented on these regional differences.

For the southern regions Macaronesia and Mediterranean the distinctive aspects are:

- 'Protected Areas' (PAs) and 'Conservation'. These elements are often linked to Pressures and Governance, since especially in PAs, the pressure by large-scale tourism should be regulated, and the unclear zonation rules for different activities (recreation, fisheries) should be improved.
- Several small-scale Socio-economic activities, such as 'Small-scale Tourism', 'Local Fisheries', and 'SMEs'.
- In the socio-cultural category Society.
- 'Local Governance' and 'Local Rules and Regulations. These are viewed to be more important than those at National level, which in their turn are again more important than those at International level. The Governance at all levels, yet especially locally, should improve with stronger rules and regulations to better control large-scale tourism, urbanisation and coastal development.

In the south European regions the stakeholders have a more society directed viewpoint, with a preference for small-scale economic activities in balance with sustainable use and conservation of the nature.

For middle Europe (Atlantic Coast, Baltic) the distinctive aspects are:

- 'Habitats', and 'Geophysical (water, air, sediment) characteristics' which are under the influence of other elements (in the Baltic especially under the negative influence of 'Agriculture' because of increasing pollution). Thus primarily related to the physical characteristics of the environment, and not to protection and conservation of nature as is coming to the foreground in the other regions.
- A long range of Socio-economic activities, among them 'Large-scale fisheries', 'Agriculture', 'Harbour', Infrastructure' and 'Urbanisation & Coastal development'. This contrasts to south and north Europe where much less economic activities are indicated as important - and if they are present then they are small-scale.
- 'Health & Quality of Life" as a Socio-cultural element.
- 'Spatial planning' in the Governance category.

In the middle European regions stakeholders have a stronger focus on large-scale economic activities, and on the structural aspects of the environment.

For North Europe (Arctic) the distinctive elements are:

- 'Conservation', 'Iconic species' and 'Exotic species', of which the first two are mainly receiving elements, thus under influence of other elements, whereas the last, 'Exotic species', have a negative influence on other elements,
- Several economic activities, some at small-scale level and judged to be positive (SME, Small-scale Tourism), 'Large-scale Fisheries' however viewed to have a negative influence, and 'Income & Employment" and "SMEs" being positively influenced by other elements,
- Clear societal issues as 'Multicultural & Indigenous Society' and 'Cultural Heritage & Traditions',
- As in the southern regions, 'Local Rules & Regulations' with a positive influence, and
- A strong Pressure in this region: 'Climate Change'.

In the north European region the stakeholders have strong viewpoints based on a balance between nature, small-scale economic activities, and multi-cultural social aspects, whereby the nowadays large-scale economic activities (large-scale tourism, large-scale fisheries) are felt as a pressure.

## 4.3. Surveys

It is remarkable that the stakeholders of all regions and of all stakeholder categories had such a similar perception on the importance, strength, or extent of presence, for the various elements in the survey, i.e. the elements were given almost the same high or low scores.
Such a high coherence in the viewpoints is even more notable given the range of traditions and cultures across Europe. At the other hand it may show that the extent to which the various elements play a role in the balance between nature, economy and society is so strong and similar that it overrides all socio-cultural differences along the European coastal research areas.

Still a couple of divergent trends were visible, which mostly were connected to a lower importance of elements in the Arctic region. Largely this is a consequence of elements that may seem logic for the far northern areas, such as a lower level for the population density, urbanisation, tourism, eutrophication, aquaculture, or horizon disturbance.
The divergent trends were sufficient, as shown in the cluster analysis, to lead to a distinction in the three groups of regions as found for the interviews - a southern, middle and south European cluster. This corroborates the findings in the interviews.

Hardly any distinctive pattern for the different stakeholder categories was found. An exception were the Public Authorities who scored Governance issues at a higher level than other stakeholders. Yet, such may be a professional skewness – the core business of authorities are of course governance issues.
Another remarkable exception in the surveys lies also with the stakeholder group of Public Authorities. The Public Authorities in Macaronesia fell in the cluster analysis within the cluster of the Atlantic Coast. Such might be explained as that those authorities are still strongly connected, or act according to, the governance and rules and regulations of their motherland at the mainland (Portugal and Spain).
These exceptions did not yield significant differences, and so the conclusion is that the various stakeholders express in general similar viewpoints. Also this corroborates the findings in the interviews.

Further the results from the surveys in general corroborate the results of the interviews. Elements judged most important elements in the surveys were largely also important in the interviews.

## 4.4. Additional surveys

In the additional surveys a reoccurring theme is that the management and monitoring of the coastal regions should become more adequate and consistent. To this end, the collaboration between government bodies and stakeholders should improve, whereby the governance bodies and agencies should communicate more and improve their coordination.

The stakeholders indicated as most relevant threats/problems for marine biodiversity in their area climate change, overfishing, eutrophication, invasive species, and habitat loss. All these elements were ranked also important elements in the interviews

As also observed in previous studies (Hummel 2022), in this study the majority of stakeholders indicated that approaches as the Ecosystem Services concept (ESC) and tools as a Decision-Support System (DSS) are not in use.

Most often international rules, such as the Habitats and Birds Directives, Natura 2000, and Marine Strategy Framework Directive, were indicated in the additional surveys to have the strongest influence, followed by a high diversity of national, regional and local rules. Such contrasts the interview results for the northern and southern European regions where the stakeholders indicated that local governance, rules and regulations are more important. This should be unraveled in the coming stakeholder consultations.

# 5. References

Hummel C, 2022. The use of the Ecosystem Service approach in Protected Area management. PhD thesis, VU Amsterdam, pp 79-102.

Hummel C, J van der Meer, K Timmermans, H Hummel, 2022. The use of Fuzzy Cognitive Models to strengthen stakeholder participation in the management of Protected Areas: the Dutch Wadden Sea. In: C. Hummel. The use of the Ecosystem Service approach in Protected Area management. PhD thesis, VU Amsterdam, pp 79-102.

Kosko, B. (1986). Fuzzy cognitive maps. International journal of man-machine studies 24(1): 65-75.

Kosko, B. (1988). Hidden patterns in combined and adaptive knowledge networks. International Journal of Approximate Reasoning 2(4): 377-393.

Kosko, B. (1993). Adaptive inference in fuzzy knowledge networks. In Readings in Fuzzy Sets for Intelligent Systems (pp. 888-891). Morgan Kaufmann.

Metsalu, T. & Vilo, J. (2015). Clustvis: A web tool for visualizing clustering of multivariate data using Principal Component Analysis and heatmap. Nucleic Acids Research, 43(W1): 566–570, 2015. doi: 10.1093/nar/gkv468.

Özesmi, U. & Özesmi, S. (2003). A participatory approach to ecosystem conservation: fuzzy cognitive maps and stakeholder group analysis in Uluabat Lake, Turkey. Environmental management 31: 0518-0531.

Özesmi, U. & Özesmi, S.L. (2004). Ecological models based on people's knowledge: a multi-step fuzzy cognitive mapping approach. Ecological modelling 176(1-2): 43-64.

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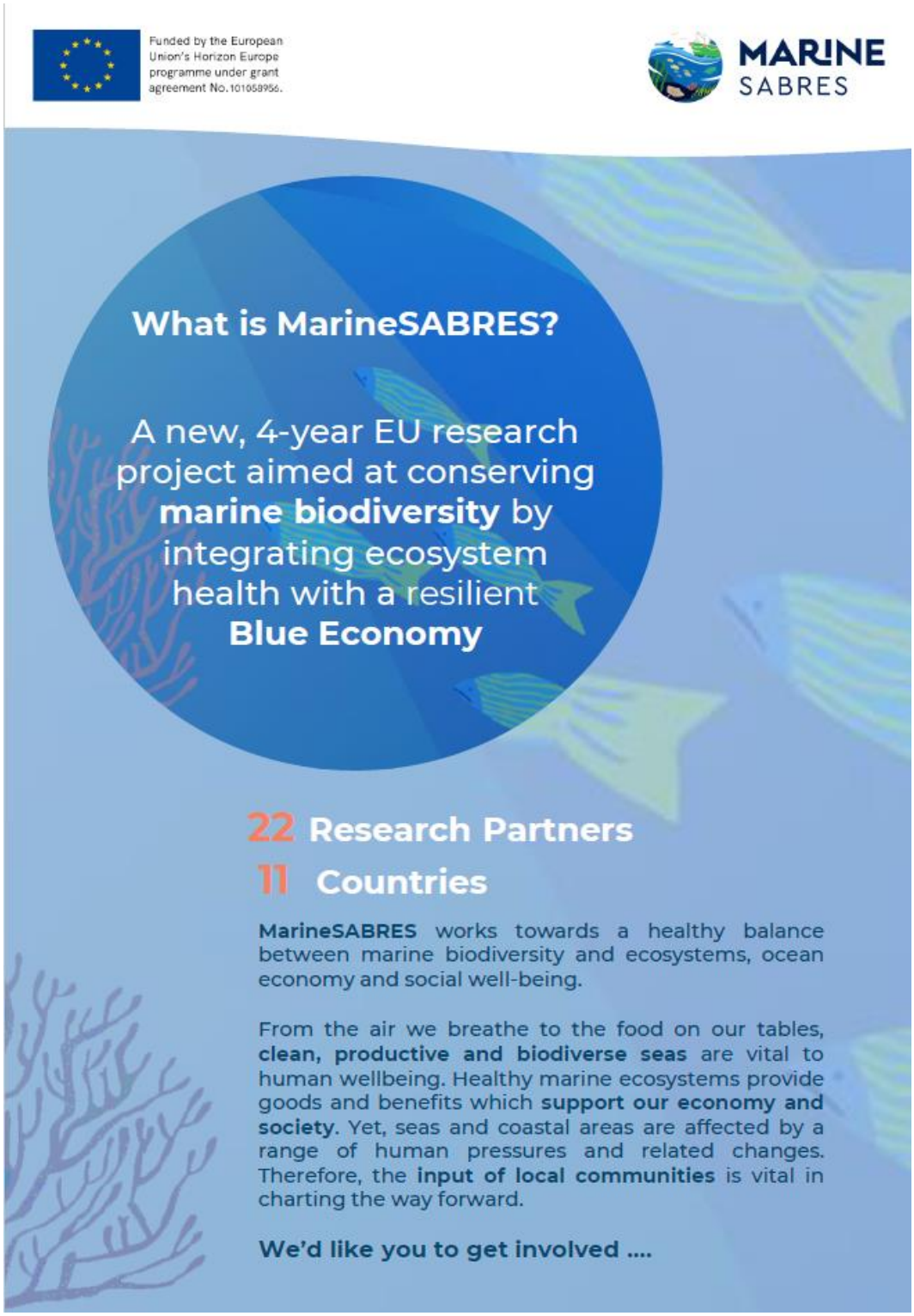
# Appendix 1. Stakeholder information flyers

Appendix 1a. Stakeholder information flyer for Marine SABRES




## Why should I become involved as a stakeholder in MarineSABRES?

MarineSABRES ultimately strives to develop a decision-making system with and for the stakeholders to empower all to make well-informed choices concerning their activities along the coast and in the sea.

We want to know how you as a stakeholder with strong bounds to the sea and to the coastal community perceive the relationship between the sea, society and economy, so that all interests can be accounted for and represented. That is why we are asking for representatives from a range of different sectors to become involved in MarineSABRES and to share their point of view.

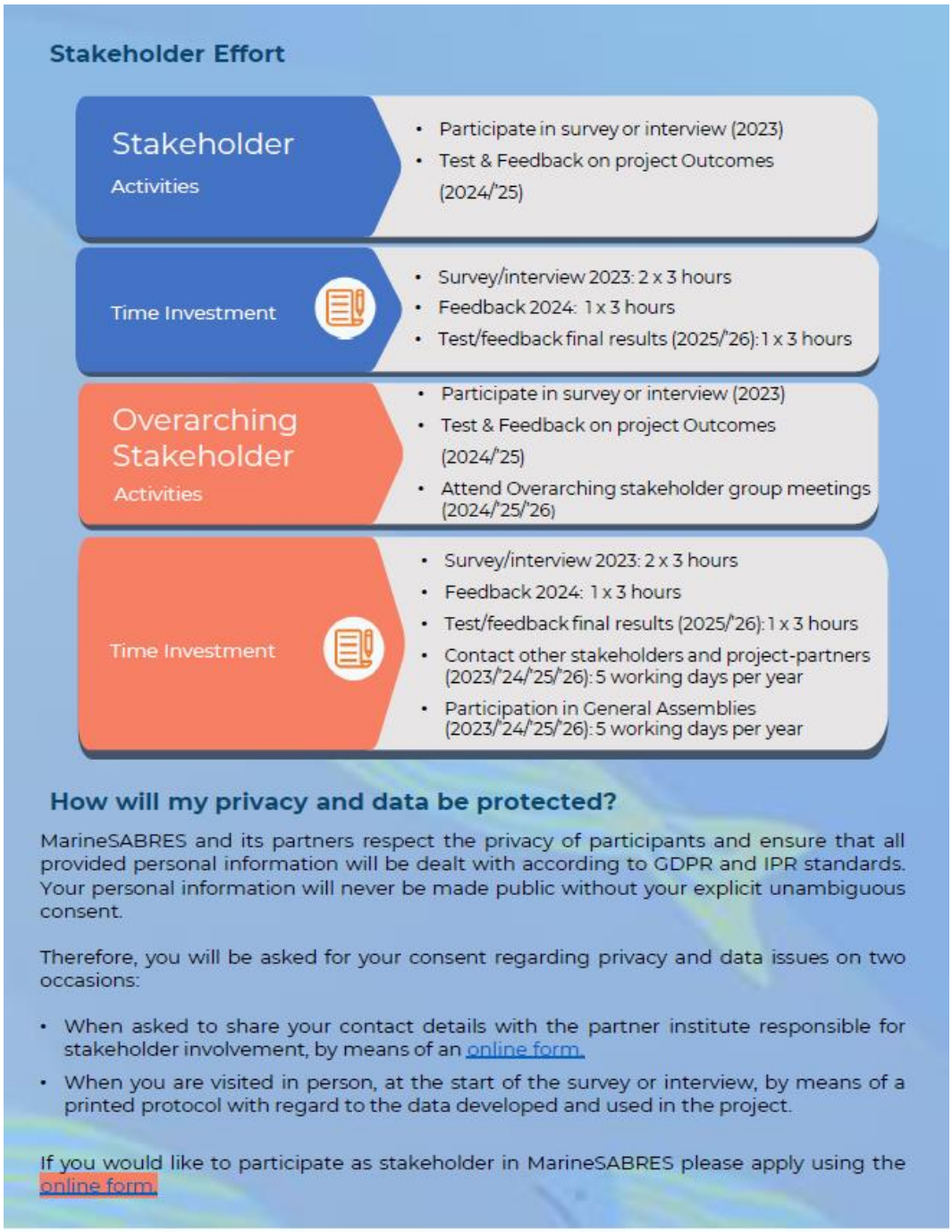
This project offers the opportunity to not only influence future management and policies that impact your living environment but also to co-develop a decision-making system supporting a sustainable and prosperous future.

## What is expected of me if I participate as a stakeholder in MarineSABRES?

MarineSABRES is a collaborative project in which researchers will work together with stakeholders to the benefit of European coastal zones and coastal communities. Stakeholders can get involved at different levels and would be expected in the first instance to share their views and perceptions of the ecological, economic, social and cultural aspects of the marine and coastal environment. If you decide to participate, an interview or survey will take place in your area in the first half year of 2023.

You can also apply to become the overarching stakeholder for your area. The overarching stakeholder will represent the stakeholders within their own research area on an international level. If you will take up the role of overarching stakeholder, you will be invited to the annual General Assembly to discuss the ins and outs of the project together with other overarching stakeholders. MarineSABRES will cover your transport, accommodation and living expenses.

If you already participate as stakeholder or overarching stakeholder and you would like to dive deeper into the project, you are welcome to take part in co-design and co-production of the project developments, tests and outcomes in collaboration with the researchers. The extra expected time investment for this role is up to your interest and availability.


Stakeholder Effort
Stakeholder Activities
Participate in survey or interview (2023)
Test & Feedback on project Outcomes (2024/'25)
Time Investment
Survey/interview 2023: 2 x 3 hours
Feedback 2024: 1 x 3 hours
Test/feedback final results (2025/'26): 1 x 3 hours
Overarching Stakeholder Activities
Participate in survey or interview (2023)
Test & Feedback on project Outcomes (2024/'25)
Attend Overarching stakeholder group meetings (2024/'25/'26)
Time Investment
Survey/interview 2023: 2 x 3 hours
Feedback 2024: 1 x 3 hours
Test/feedback final results (2025/'26): 1 x 3 hours
Contact other stakeholders and project-partners (2023/'24/'25/'26): 5 working days per year
Participation in General Assemblies (2023/'24/'25/'26): 5 working days per year
How will my privacy and data be protected?
MarineSABRES and its partners respect the privacy of participants and ensure that all provided personal information will be dealt with according to GDPR and IPR standards. Your personal information will never be made public without your explicit unambiguous consent.
Therefore, you will be asked for your consent regarding privacy and data issues on two occasions:
When asked to share your contact details with the partner institute responsible for stakeholder involvement, by means of an online form.
When you are visited in person, at the start of the survey or interview, by means of a printed protocol with regard to the data developed and used in the project.
If you would like to participate as stakeholder in MarineSABRES please apply using the online form.

Appendix 1b. Stakeholder information flyer for MARBEFES

MARBEFES has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement no 101060937

## Why should I become involved as stakeholder in MARBEFES?

Your engagement as stakeholder is central to the project because MARBEFES aims to enable people working and living in coastal communities to make informed decisions that will benefit human and ecosystem needs.

We want to know how you as stakeholder with strong bounds to the sea and to the coastal community perceive the relationship between the sea, society and economy. In that way, all interests can be taken into account and represented. This is why we ask representatives from a range of different sectors to become involved in MARBEFES and share their point of view.

To ensure that future marine environmental policy and coastal management is to the point and in line with the wishes and needs of citizens and local parties, your participation as stakeholder is fundamental.

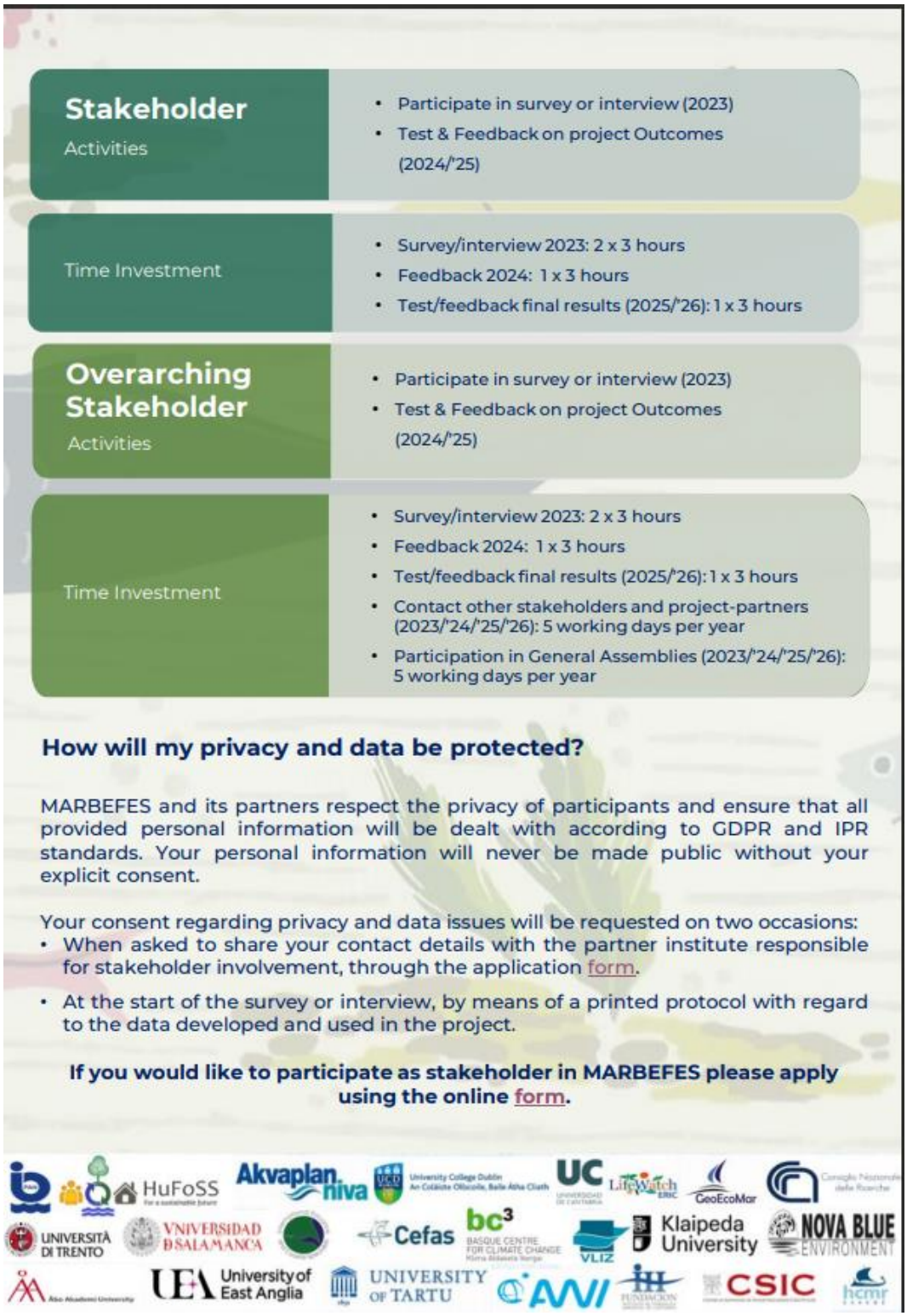
This project offers the opportunity to influence future management and policies that impact your living environment and contribute to a sustainable and prosperous future.

## What is expected of me if I participate as a stakeholder in MARBEFES?

Stakeholders can get involved at different levels. All stakeholders are invited to share their views on the ecological, economic, social and cultural aspects of the marine and coastal environment in an interview or survey in 2023.

You can also apply to become the overarching stakeholder for your area. The overarching stakeholder will represent the stakeholders of their own area on an international level. If you take up the role of overarching stakeholder, you will be invited to the annual General Assembly to discuss the ins and outs of the project together with other overarching stakeholders and researchers. MARBEFES will cover your transport, accommodation and living expenses.

If you already participate as stakeholder or overarching stakeholder and you would like to become more deeply involved, you are welcome to take part in co-design and co-production of the project developments, tests and outcomes in collaboration with the researchers. The expected time investment of your participation as stakeholder is indicated in the table below.


Stakeholder
Activities
• Participate in survey or interview (2023)
• Test & Feedback on project Outcomes (2024/'25)
Time Investment
• Survey/interview 2023: 2 x 3 hours
• Feedback 2024: 1 x 3 hours
• Test/feedback final results (2025/'26): 1 x 3 hours
Overarching Stakeholder
Activities
• Participate in survey or interview (2023)
• Test & Feedback on project Outcomes (2024/'25)
Time Investment
• Survey/interview 2023: 2 x 3 hours
• Feedback 2024: 1 x 3 hours
• Test/feedback final results (2025/'26): 1 x 3 hours
• Contact other stakeholders and project-partners (2023/'24/'25/'26): 5 working days per year
• Participation in General Assemblies (2023/'24/'25/'26): 5 working days per year
How will my privacy and data be protected?
MARBEFES and its partners respect the privacy of participants and ensure that all provided personal information will be dealt with according to GDPR and IPR standards. Your personal information will never be made public without your explicit consent.
Your consent regarding privacy and data issues will be requested on two occasions:
• When asked to share your contact details with the partner institute responsible for stakeholder involvement, through the application form.
• At the start of the survey or interview, by means of a printed protocol with regard to the data developed and used in the project.
If you would like to participate as stakeholder in MARBEFES please apply using the online form.
HuFoSS
Akvaplan niva
UC
LifeWatch ERIC
GeoEcoMar
UNIVERSITÀ DI TRENTO
VNIVERSIDAD D SALAMANCA
Cefas
bc3
VLIZ
Klaipeda University
NOVA BLUE ENVIRONMENT
UEA University of East Anglia
UNIVERSITY OF TARTU
CSIC
hcmr

# Appendix 2. Interview and survey protocol

The purpose of the interview and survey is to obtain better insight into the status and management of the marine and coastal area in question. The two methods are complementary to each other. To this end, HuFoSS will inventory stakeholders' perceptions of the natural environment, related social and economic aspects, and the most important pressures that impact these relations. Such insight is needed in order to be able to integrate stakeholders' views and opinions in the environmental policy and management tools to be developed. Taking into account stakeholder interests is vital to the realization of sustainable and efficient policy and management with public support.

To map stakeholders' perceptions, HuFoSS (WP2) conducts interviews in which HuFoSS employs "Fuzzy Cognitive Modelling" (FCM) and surveys where questions are answered on a "Likert-scale". Both methods are held in person with participant(s), possibly at the residence/institute of the stakeholder themselves, and will last about 1,5 hours for an interview and 1 hour to complete the survey. Unlike the survey the interview is not based on a set of questions, instead interviewees are free to share what they think is important.
After a brief introduction of the project and the purpose and outline of the interview, participants will be asked to share their views on the following question: "What are the most important factors in the relationship between the marine ecosystem and its biodiversity, and the services and benefits it can deliver, and the associated marine economy and social well-being in your coastal community".

The HuFoSS team consists of the following:

- Interviewer
- Note-taker

The HuFoSS team will use the following amenities:

- 2 Magnetic whiteboard sheets, 100cm by 45 cm
- 25 Magnetic whiteboard 'sticky-notes', different colours
- Whiteboard markers, different colours
- Paper notebook and pencils
- Survey sheet, paper A2 format
- 93 Variable-cards (divided in 6 categories), 7 different colours
- A device to take photos with (mobile phone)

Aspects to take into consideration before the interview and Survey:

- Make sure the interview takes place in a calm environment
- Clear the table/desk so all attributes can be placed on the table
- Make sure participant(s) feel comfortable and are familiar with the procedure
- Let the participants, just before starting the interview or survey, fill in the Informed Consent Forms (Appendix 3)

**The interview**
The interview consists of two phases. In the first hour, participant(s) share their views on the above mentioned issues. with a minimum of interference from our team. HuFoSS team members will note down important factors raised as keywords. In the second phase, together with the participant the list of keywords is viewed over and the participant is asked to indicate the relationships between the different factors with arrows. Relationships can indicate either positive or negative influences and should receive a rank (ranging from -5 to +5). This exercise maps otherwise 'fuzzy' stakeholder knowledge, uncovering which factors are perceived as important, and how they are thought to interrelate.
Please note that stakeholders may be represented by more than one person, i.e. with one or two colleagues.

**First phase of interview**
The interviewer gently guides the interview by repeating what has been said and drawing conclusions. It is important that the interviewer does not steer the conversation too much and refrains from putting words in somebody's mouth.
The note-taker listens carefully and writes down the most important factors mentioned as keywords on paper (10 to 30 words), taking care not to distract the participant(s).

**Second phase of interview**
When the stakeholder has finished speaking, they can take a 5 to 10 minute break. In the break, the interviewer and note-taker agree on the list of keywords and write them down on separate magnetic-notes.

Magnetic-notes with keywords should then be placed on the big magnetic sheet. Place the notes in an open oval-shape. Try to pre-order them into 4 categories. **Green** for ecosystems and nature (to the left of the big magnetic sheet), **Blue** for the blue-economy, **Orange/Yellow** for social, governmental and cultural keywords and **Red** for pressures (to the right of the big sheet).

Consult the participant(s) on the final placement of the magnetic-notes, if they want to add a keyword or merge two or more words, this is allowed.

- Take care to explain the procedure again
- Note name, date and profession of the stakeholder on the magnetic sheet

Take a picture at this stage (to prevent coincidental loss of keywords by whipping them out at the cards once touching and repositioning them in the second stage)

Participant(s) draw arrows between keywords to indicate relationships between them, which can be either positive or negative influences. Relationships should be ranked on a scale from -5 to +5.

Start the procedure by asking participant(s) what they think are the most important keywords and relationships. When they feel comfortable and get the hang of it, go through each note systematically, asking the participant(s) if they think it is related to another note. When all relevant relationships have been pointed out with arrows, and ranked, the exercise is complete and the interview is finished.

- Take a picture of the completed sheet, don't forget to include name date and profession of stakeholder
- Save all pictures carefully and email them to yourself

**Survey**
When the interview and survey are executed by the same person, note that the survey should always be held after the interview has taken place. This to prevent the stakeholder to be primed.

During the survey the participant is presented with a set of 93 different cards, each with their own variables. The variables are categorized into 6 categories: [1] Ecosystem services | [2] Ecosystem structures and functions | [3] Socio-Cultural | [4] Socio-Economics | [5] Governance | [5.b] Governance - rules and regulations | [6] Pressures.

Each category comes with it's own question. For category [1] & [2] the question presented is: What is the importance of the following variables in your coastal area? For category [3] & [4] the question is: How strong is the relationship between the following variables in your coastal area? For category [5] & [5.b] the question is: To what extent are the following variables present in the governance in your coastal area? And for the last category [6], the question is: To what extent are the following variables pressures in your coastal area?

The stacks of cards from each category are given to the stakeholder in turn. For each category, the cards are then laid out a Likert scaling from 0 to 5 on a large sheet on the table. Were 0 stand for 'not present' or, 'of zero importance' and 5 stands for 'most important'.

After the cards of one category are all placed down a picture is taken. After this you continue to the next category until all categories (93 cards in total) are ranked by the stakeholder and you have 7 different pictures.

- Take a picture of the ranked cards per category, don't forget to include name date and profession of stakeholder
- Save all pictures carefully and email them to yourself

# Appendix 3. GDPR and IPR protocol

At the start of the surveys and interviews, stakeholders are requested to give consent for sharing the data resulting from the survey and interview. The partners within Marine SABRES and MARBEFES respect the privacy of all participants and ensure that all provided personal information, will be dealt with following the rules below:

- Contact details and personal data will never be provided to third parties without the stakeholders' explicit unambiguous consent.
- Although eventually all research-data produced in Marine SABRES and MARBEFES will be available for open access, personal data will be excluded from publication in case the stakeholder does not agree on sharing those data.
- At the start of the surveys and interviews we ask stakeholders, by means of a printed Document of Informed Consent, to indicate which option they want to follow regarding data protection and privacy.
- At any moment the stakeholder can request to remove their personal data out of any of the files.
- If, during the interview, third parties (persons or institutions) are mentioned by name, these will be generalized in non-traceable terms in the result section of any report or publication.

The Document of Informed consent for both projects follows below.

Appendix 3a. Document of Informed Consent used in Marine SABRES

Funded by the European Union

# DOCUMENT OF INFORMED CONSENT

**Grant Agreement No.:** 101058956
**Project Title:** MarineSABRES - Marine Systems Approaches for Biodiversity Resilience and Ecosystem Sustainability
**Start date of the project:** 1 September 2022
**End date of the project:** 31 August 2026
**Project Website:** https://www.marinesabres.eu/

You have been invited to participate in research under the MarineSABRES project in the form of an event, a survey, or an interview. Before participating, please read the information below carefully. Views and opinions are only those of the author(s) and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible. If statements in the document are unclear, do not hesitate to ask the contact researcher or coordinator for clarification.

## 1. Project summary

Marine SABRES is a 4-year EU research project aimed at conserving marine biodiversity by integrating ecosystem health with a resilient Blue Economy. MarineSABRES works towards a healthy balance between marine biodiversity, ecosystems, ocean economy, and social well-being. From the air we breathe to the food on our tables, clean, productive and biodiverse seas are vital to human wellbeing. Healthy marine ecosystems provide goods and benefits which support our economy and society. Yet, seas and coastal areas are affected by various human pressures and related changes. Therefore, the input of local communities is vital in charting the way forward.

## 2. Purpose of data collection

In the MarineSABRES project, stakeholders are asked to give their views on the functioning of the marine ecosystem, its biodiversity, the ecosystem services, and benefits derived from it and the socio-cultural and economic activities based on it. In addition, stakeholders are asked to help co-design and co-produce the research and outcomes developed in MarineSABRES. All stakeholders are given the possibility to provide feedback on the development of models and tools. Therefore, it is necessary to collect contact details from stakeholders who want to participate in the feedback process and/or co-design and co-production of the project. Resulting data will be specifically used to support the successful completion of the MarineSABRES project.


## 3. Benefit of participation

Benefit of participation is on an entirely voluntary basis, and you may not directly benefit. However, you will substantially contribute to the MARINE project's aims.

## 4. Risks of participation

There are no risks foreseen in participation

## 5. Compliance with ethical and legal regulations

We comply with EU and national ethical and legal regulations, including the latest GDPR (General Data Protection Regulation 2016/680) framework of the EU.

## 6. Privacy and data protection

MarineSABRES and its partners respect the privacy of participants in the survey and ensure that all contact details provided, will be dealt with following the rules below:

- Without the stakeholders' explicit, unambiguous consent, contact details will never be provided to third parties.
- Although eventually, all results and raw data produced in Marine SABRES will be available for open access, these results and data will not be traceable to a person or institute. They will be anonymised.
- Contact details will be excluded from publication if the stakeholder disagrees with sharing those data. If a stakeholder disagrees with sharing data, contact details will be excluded from the acknowledgements in publications. On the other hand, all participants can be included in the acknowledgements or added as co-author in case of a major contribution to future publications.
- If third parties (persons or institutions) are mentioned by name during the interview, these will be generalised in non-traceable terms in the result section of any report or publication.
- Data from surveys and interviews will be recorded and stored on secure servers.
- Data might be processed and analysed for publication in reports, scientific journals and other project outputs, only anonymously. The retention time of the original research data is the same as the project duration. However, the anonymised resultant data may be stored longer for future research. The data controller keeps a copy of informed consent for up to 3 years after project closure, and the research participant can request access.


- MARINE SABRES project partners and project management team reserve the right to use any photograph/video taken at any MARINE SABRES. Project partners and project management team may use the photograph/video in publications or other media material produced, used or contracted by MARINE SABRES, including but not limited to: brochures, invitations, books, newspapers, magazines, television, websites, etc.

## 7. Disclaimer

The content of this survey has been compiled with the utmost care in the frame of the MarineSABRES project. The responsible partner is Hummel Foundation for Sustainable Solutions (HuFoSS), Roosendaal, the Netherlands (contact Prof.Dr. Herman Hummel, herman.hummel@hufoss.nl). If you need to revoke or change provided or withdraw your participation in the event, survey or interview, this can be done by contacting herman.hummel@hufoss.nl. MarineSABRES and the responsible partners aim to keep the contact details in its repositories permanently as accurate and up-to-date as possible. Therefore, changes in contact details are always reserved.
MarineSABRES and its partners are in no way responsible and shall not be liable for any claims or damages that are the direct or indirect consequence of or in connection with the use of the information available in this survey.

## 8. Researcher contact

In case of any issues or questions, you can contact Prof. Dr. Herman Hummel, herman.hummel@hufoss.nl.

## 9. Copyright

All rights to the survey, or texts, services, products, and other items derived from the study, are based on and reserved to MarineSABRES, its partners, and participants of this survey unless otherwise stated. Survey materials can be used solely with the permission of the responsible partner (HuFoSS). Copies, adaptations, translations, edits, and changes to all or part of the survey, in any form or by any means, are strictly prohibited unless HuFoSS has granted prior written permission.

Should you believe that your rights and/or third parties' rights are infringed, you can notify the responsible partners via the e-mail address herman.hummel@hufoss.nl.


## 10. Consent statement

Please indicate which option you want to follow regarding data protection and privacy.

| MARINESABRES partners may use provided data (anonymised answers to the survey and interview) | | Third parties outside MARINESABRES (e.g. EU, UNESCO) may use provided data (anonymised answers to the survey and interview) | | Acknowledgements in resulting publication e.g. research reports, articles (Personal name and institute name can both be mentioned) | | |
|---|---|---|---|---|---|---|
| Yes | No | Yes | No | Personal name in the acknowledgements as data provider | Institutional name in the acknowledgements as data provider | Anonymous (no mentioning in the acknowledgements) |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Remarks: | | | | | | |

☐ I have read and understood the consent terms and agree to participate in this study, including the processing of my responses by HuFoSS.

Participant:_____ Date: _____

Researcher: _____Date: _____

Appendix 3b. Document of Informed Consent used in MARBEFES

Funded by the European Union

# DOCUMENT OF INFORMED CONSENT

**Grant Agreement No.:** 101060937
**Project Title:** MARine Biodiversity and Ecosystem Functioning leading to Ecosystem Services
**Start date of the project:** 1 September 2022
**End date of the project:** 31 August 2026
**Project Website:** https://www.marbefes.eu/

You have been invited to voluntarily participate in research under the MARBEFES project in the form of an event, a survey, or an interview. Before participating, please read the information below carefully. Views and opinions are only those of the author(s) and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible. If statements in the document are unclear, do not hesitate to ask the contact researcher or coordinator for clarification.

## 1. Project summary

MARBEFES is a 4-year EU project that researches how marine biodiversity is linked with goods and services provided by marine ecosystems, in order to create policy and management tools that support informed decision-making. MARBEFES will progress substantially beyond the current state-of-the-art understanding of the causes and consequences of the maintenance, loss and gain of biodiversity and ecological and economic value and the repercussions of this for the management and governance of European seas. Healthy marine ecosystems provide goods and benefits which support our economy and society. Yet, seas and coastal areas are affected by various human pressures and related changes. Therefore, the input of local communities is vital in charting the way forward.

## 2. Purpose of data collection

In the MARBEFES project, stakeholders are asked to give their views on the functioning of the marine ecosystem, its biodiversity, the ecosystem services, and benefits derived from it and the socio-cultural and economic activities based on it. In addition, stakeholders are asked to help co-design and co-produce the research and outcomes developed in MARBEFES. All stakeholders are given the possibility to provide feedback on the development of models and tools. Therefore, it is necessary to collect contact details from stakeholders who want to participate in the feedback process and/or co-design and co-production of the project. Resulting data will be specifically used to support the successful completion of the MARBEFES project.

Funded by
the European Union

## 3. Benefit of participation

Benefit of participation is on an entirely voluntary basis, and you may not directly benefit. However, you will substantially contribute to the MARBEFES project's aims.

## 4. Risks of participation

There are no risks foreseen in participation.

## 5. Compliance with ethical and legal regulations

We comply with EU and national ethical and legal regulations, including the latest GDPR (General Data Protection Regulation 2016/680) framework of the EU.

## 6. Privacy and data protection

MARBEFES and its partners respect the privacy of participants in the survey and ensure that all contact details provided, will be dealt with following the rules below:

- Without the stakeholders' explicit, unambiguous consent, contact details will never be provided to third parties.
- Although eventually, all results and raw data produced in MARBEFES will be available for open access, these results and data will not be traceable to a person or institute. They will be anonymised.
- Contact details will be excluded from the acknowledgements in publication if the stakeholder disagrees with sharing those data. On the other hand, all participants can be included in the acknowledgements or added as co-author in case of a major contribution to future publications.
- If third parties (persons or institutions) are mentioned by name during the interview, these will be generalised in non-traceable terms in the result section of any report or publication.
- Data from surveys and interviews will be recorded and stored on secure servers.
- Data might be processed and analysed for publication in reports, scientific journals and other project outputs, only anonymously. The retention time of the original research data is the same as the project duration. However, the anonymised resultant data may be stored longer for future research. The data controller keeps a copy of informed consent for up to 3 years after project closure, and the research participant can request access.
- MARBEFES project partners and project management team reserve the right to use any photograph/video taken at any MARBEFES. Project partners and project management team may use the photograph/video in publications or other media material produced, used or contracted by MARBEFES, including but not limited to: brochures, invitations, books, newspapers, magazines, television, websites, etc.

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the European Union

## 7. Disclaimer

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MARBEFES and its partners are in no way responsible and shall not be liable for any claims or damages that are the direct or indirect consequence of or in connection with the use of the information available in this survey.

## 8. Researcher contact

In case of any issues or questions, you can contact Prof. Dr. Herman Hummel, herman.hummel@hufoss.nl.

## 9. Copyright

Funded by the European Union

## 10. Consent statement

Please indicate which option you want to follow regarding data protection and privacy.

| MARBEFES partners may use to provided data (anonymised answers to the survey and interview) | | Third parties outside MARBEFES (e.g. EU, UNESCO) may use provided data (anonymised answers to the survey and interview) | | Acknowledgements in resulting publication e.g. research reports, articles (Personal name and institute name can both be mentioned) | | |
|---|---|---|---|---|---|---|
| Yes | No | Yes | No | Personal name in the acknowledgements as data provider | Institutional name in the acknowledgements as data provider | Anonymous (no mentioning in the acknowledgements) |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Remarks: | | | | | | |

☐ I have read and understood the consent terms and agree to participate in this study, including the **processing of my responses by HuFoSS.**

Participant:_____ Date: _____

Researcher: _____Date: _____

# Appendix 4. Date, type and category of Stakeholder consultations

| MarineSABRES - Tuscan archipelago | | | |
|---|---|---|---|
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 20-2-2023 | 1 | Interview & Survey | Academia & research |
| 20-2-2023 | 2 | Interview & Survey | Public audience |
| 20-2-2023 | 3 | Interview & Survey | Public audience |
| 21-2-2023 | 4 | Interview & Survey | Public authorities |
| 21-2-2023 | 5 | Interview & Survey | Industry & private sector |
| 22-2-2023 | 6 | Interview | Industry & private sector |
| 23-2-2023 | 7 | Interview & Survey | Public authorities |
| | | | |
| **MARBEFES - Sardinia** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 27-2-2023 | 1 | Interview & Survey | Industry & private sector |
| 27-2-2023 | 2 | Interview | Public audience |
| 28-2-2023 | 3 | Interview | Academia & research |
| 28-2-2023 | 4 | Interview & Survey | Industry & private sector |
| 1-3-2023 | 5 | Interview & Survey | Industry & private sector |
| 1-3-2023 | 3 | Survey | Academia & research |
| 1-3-2023 | 6 | Interview & Survey | Academia & research |
| 1-3-2023 | 7 | Interview | Industry & private sector |
| 2-3-2023 | 8 | Interview | Public authority |
| 2-3-2023 | 9 | Survey | Public authority |
| 2-3-2023 | 11 | Survey | Public authority |
| 2-3-2023 | 12 | Survey | Public audience |
| 2-3-2023 | 14 | Survey | Industry & private sector |
| 2-3-2023 | 16 | Survey | Public audience |
| 2-3-2023 | 18 | Survey | Academia & research |
| 3-3-2023 | 19 | Interview | Industry & private sector |
| 3-3-2023 | 20 | Interview | Industry & private sector |
| | | | |
| **MARBEFES - Gulf of Biscay** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 13-3-2023 | 1 | Interview & Survey | Public audience |
| 13-3-2023 | 2A | Ìnterview | Public audience |
| 13-3-2023 | 2B | Interview | Academia & Research |
| 14-3-2023 | 3 | Interview & Survey | Industry & private sector |
| 14-3-2023 | 4 | Interview | Academia & research |
| 15-3-2023 | 5 | Interview | Public authority |
| 15-3-2023 | 6 | Survey | Industry & private sector |
| 15-3-2023 | 7 | Survey | Public authority |
| 15-3-2023 | 8 | Survey | Public authority |
| 15-3-2023 | 9 | Survey | Public authority |
| 15-3-2023 | 10 | Survey | Public authority |
| 15-3-2023 | 11 | Survey | Industry & private sector |

| | | | |
|---|---|---|---|
| 15-3-2023 | 12 | Survey | Academia & Research |
| 15-3-2023 | 13 | Survey | Industry & private sector |
| 16-3-2023 | 14 | Interview | Public authority |
| 16-3-2023 | 15 | Interview & Survey | Public authority |
| 16-3-2023 | 16 | Interview & Survey | Industry & private sector |
| 17-3-2023 | 17 | Interview & Survey | Academia & research |
| | | | |
| **MarineSABRES - Azores** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 27-3-2023 | 1 | Interview & Survey | Industry & private sector |
| 27-3-2023 | 2 | Interview & Survey | Public audience |
| 27-3-2023 | 3 | Interview & Survey | Public audience |
| 27-3-2023 | 4 | Interview & Survey | Public audience |
| 27-3-2023 | 5 | Interview & Survey | Public audience |
| 28-3-2023 | 6 | Interview & Survey | Public authorities |
| 28-3-2023 | 7 | Interview & Survey | Industry & private sector |
| 28-3-2023 | 8 | Interview & Survey | Industry & private sector |
| 28-3-2023 | 9 | Interview | Industry & private sector |
| 28-3-2023 | 10 | Interview & Survey | Public authorities |
| 28-3-2023 | 11 | Interview & Survey | Industry & private sector |
| 29-3-2023 | 12 | Survey | Academia & research |
| 30-3-2023 | 13 | interview | Industry & private sector |
| 30-3-2023 | 14 | Interview & Survey | Public audience |
| 30-3-2023 | 15 | Interview & Survey | Public authorities |
| 30-3-2023 | 16 | Interview | Public audience |
| 30-3-2023 | 17 | Interview & Survey | Public audience |
| 30-3-2023 | 18 | Interview & Survey | Industry & private sector |
| 31-3-2023 | 19 | Interview & Survey | Industry & private sector |
| 29-3-2023 | 20 | Survey | Academia & research |
| | | | |
| **MARBEFES - Gulf of Heraklion** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 3-4-2023 | 1 | Interview & Survey | Public authorities |
| 3-4-2023 | 2 | Interview & Survey | Public authorities |
| 3-4-2023 | 3 | Interview | Academia & research |
| 4-4-2023 | 4 | Interview & Survey | Public audience |
| 4-4-2023 | 5 | Interview & Survey | Academia & research |
| 4-4-2023 | 6 | Survey | Academia & research |
| 4-4-2023 | 7 | Survey | Industry & private sector |
| 5-4-2023 | 8 | Interview & Survey | Public authorities |
| 5-4-2023 | 10 | Interview & Survey | Industry & private sector |
| 5-4-2023 | 12 | Interview & Survey | Academia & research |
| 6-4-2023 | 13 | Interview & Survey | Public authorities |
| 6-4-2023 | 14 | Interview & Survey | Academia & research |
| 6-4-2023 | 15 | Interview & Survey | Industry & private sector |
| 6-4-2023 | 16 | Interview & Survey | Public authorities |
| 6-4-2023 | 17 | Interview & Survey | Public authorities |

| | | | |
|---|---|---|---|
| 7-4-2023 | 18 | Interview & Survey | Industry & private sector |
| 7-4-2023 | 19 | Interview | Industry & private sector |
| 7-4-2023 | 20 | Interview & Survey | Public audience |
| 7-4-2023 | 21 | Interview & Survey | Industry & private sector |
| 7-4-2023 | 22 | Interview & Survey | Industry & private sector |
| | | | |
| **MARBEFES - Balearic islands** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 18-4-2023 | 1 | Interview & Survey | Industry & private sector |
| 18-4-2023 | 2 | Interview | Public authorities |
| 18-4-2023 | 3 | Interview & Survey | Public audience |
| 19-4-2023 | 4 | Interview & Survey | Academia & research |
| 19-4-2023 | 5 | Interview & Survey | Public audience |
| 19-4-2023 | 6 | Survey | Public audience |
| 19-4-2023 | 7 | Survey | Public authorities |
| 19-4-2023 | 8 | Survey | Public authorities |
| 20-4-2023 | 9 | Interview & Survey | Public authorities |
| 20-4-2023 | 10 | Interview | Public authorities |
| 20-4-2023 | 11 | Interview & Survey | Public authorities |
| 20-4-2023 | 12 | Interview | Industry & private sector |
| 21-4-2023 | 13 | Interview & Survey | Public authorities |
| 21-4-2023 | 14 | Interview & Survey | Public audience |
| 21-4-2023 | 15 | Interview & Survey | Public authorities |
| 22-4-2023 | 16 | Interview & Survey | Academia & research |
| | | | |
| **MARBEFES - Belgium Doggerbank** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 25-4-2023 | 1 | Interview & Survey | Academia & research |
| 26-4-2023 | 2 | Interview & Survey | Public authority |
| 27-4-2023 | 3 | Interview & Survey | Academia and research |
| 28-4-2023 | 4 | Interview & Survey | Public authority |
| 15-5-2023 | 5 | Interview & Survey | Public audience |
| 15-5-2023 | 6 | Interview & Survey | Academia & research |
| 15-5-2023 | 7 | Interview & Survey | Public audience |
| 15-5-2023 | 8 | Interview & Survey | Public audience |
| 15-5-2023 | 9 | Interview & Survey | Public audience |
| 16-5-2023 | 10 | Interview & Survey | Public audience |
| 16-5-2023 | 11 | Interview & Survey | Academia & research |
| 16-5-2023 | 12 | Interview & Survey | Public authority |
| 16-5-2023 | 13 | Interview & Survey | Academia & research |
| 5-7-2023 | 14 | Interview & Survey | Public audience |
| | | | |
| **MarineSABRES - Madeira** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 2-5-2023 | 1 | Survey | Academia & research |
| 2-5-2023 | 2 | Survey | Public authority |
| 2-5-2023 | 3 | Survey | Academia & research |

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| 2-5-2023 | 4 | Survey | Academia & research |
| 2-5-2023 | 5 | Survey | Academia & research |
| 2-5-2023 | 6 | Survey | Academia & research |
| 2-5-2023 | 7 | Survey | Industry & private sector |
| 2-5-2023 | 8 | Survey | Public authority |
| 3-5-2023 | 9 | Interview | Public authority |
| 3-5-2023 | 10 | Interview & Survey | Public authority |
| 3-5-2023 | 11 | Interview & Survey | Public authority |
| 3-5-2023 | 12 | Survey | Public authority |
| 3-5-2023 | 13 | Survey | Academia & research |
| 3-5-2023 | 14 | Survey | Industry & private sector |
| 4-5-2023 | 2, 15 | Interview | Public authority |
| 5-5-2023 | 16 | Interview | Academia & research |
| 5-5-2023 | 17 | Interview | Academia & research |
| 5-5-2023 | 18 | Interview | Public authority |
| | | | |
| **MARBEFES - Finnish archipelago** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 23-5-2023 | 1 | Interview & Survey | Academia & research |
| 23-5-2023 | 2 | Interview & Survey | Public authority |
| 23-5-2023 | 3 | Interview & Survey | Academia & research |
| 23-5-2023 | 4 | Interview & Survey | Academia & research |
| 24-5-2023 | 5 | Interview & Survey | Industry & private sector |
| 24-5-2023 | 6 | Interview & Survey | Public audience |
| 24-5-2023 | 7 | Interview & Survey | Public authority |
| 25-5-2023 | 8 | Interview & Survey | Public audience |
| 25-5-2023 | 9 | Interview & Survey | Industry & private sector |
| 25-5-2023 | 10 | Interview & Survey | Industry & private sector |
| 26-5-2023 | 11 | Interview & Survey | Public audience |
| 26-5-2023 | 12 | Interview & Survey | Public audience |
| 26-5-2023 | 13 | Interview & Survey | Academia & research |
| 26-5-2023 | 14 | Interview & Survey | Academia & research |
| | | | |
| **MARBEFES - Curonian Lagune** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 29-5-2023 | 1 | Interview | Public authority |
| 29-5-2023 | 2 | Interview | Public audience |
| 29-5-2023 | 3 | Interview & Survey | Industry & private sector |
| 29-5-2023 | 4 | Interview & Survey | Public audience |
| 29-5-2023 | 5 | Interview & Survey | Academia & research |
| 30-5-2023 | 6 | Interview & Survey | Public authority |
| 30-5-2023 | 7 | Interview & Survey | Public authority |
| 30-5-2023 | 8 | Interview | Public authority |
| 30-5-2023 | 9 | Interview & Survey | Academia & research |
| 30-5-2023 | 10 | Interview | Industry & private sector |
| 30-5-2023 | 11 | Interview | Industry & private sector |
| 30-5-2023 | 12 | Interview & Survey | Academia & research |

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| 30-5-2023 | 13 | Survey | Public audience |
| 31-5-2023 | 14 | Interview & Survey | Public authority |
| 31-5-2023 | 15 | Interview & Survey | Industry & private sector |
| 31-5-2023 | 16 | Interview & Survey | Public audience |
| 31-5-2023 | 17 | Interview & Survey | Industry & private sector |
| | | | |
| **MARBEFES - Porsangerfjord** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 12-6-2023 | 1 | interview & Survey | Public authority |
| 12-6-2023 | 3 | interview & Survey | Academia & research |
| 12-6-2023 | 4 | interview & Survey | Public audience |
| 14-6-2023 | 5 | interview & Survey | Industry & private sector |
| 14-6-2023 | 6 | interview & Survey | Industry & private sector |
| 14-6-2023 | 7 | interview & Survey | Academia & research |
| 14-6-2023 | 8 | interview & Survey | Public audience |
| 15-6-2023 | 9 | interview & Survey | Academia & research |
| 16-6-2023 | 10 | interview & survey | Industry & private sector |
| 16-6-2023 | 11 | interview & Survey | Industry & private sector |
| 16-6-2023 | 12 | Interview & Survey | Industry & private sector |
| 16-6-2023 | 13 | Interview & Survey | Industry & private sector |
| | | | |
| **MARBEFES - Svalbard** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 12-6-2023 | 1 | interview & Survey | Academia & research |
| 19-6-2023 | 2 | interview | Industry & private sector |
| 19-6-2023 | 3 | Interview & Survey | Academia & research |
| 19-6-2023 | 4 | Interview | Industry & private sector |
| 20-6-2023 | 5 | Interview & Survey | public audience |
| 20-6-2023 | 6 | Interview & Survey | Academia & research |
| 20-6-2023 | 7 | Interview & Survey | Industry & private sector |
| 21-6-2023 | 8 | Interview & Survey | Industry & private sector |
| 21-6-2023 | 9 | Interview | Public audience |
| 21-6-2023 | 10 | Interview & Survey | Public authority |
| 22-6-2023 | 11 | Interview & Survey | Academia & research |
| 22-6-2023 | 12 | Interview & Survey | Public authority |
| 22-6-2023 | 13 | Interview & Survey | Industry & private sector |
| 23-6-2023 | 14 | Interview & Survey | Academia & research |
| 23-6-2023 | 15 | Interview & Survey | public authority |
| 23-6-2023 | 16 | Interview | Public audience |
| 23-6-2023 | 17 | Interview & Survey | Industry & private sector |
| | | | |
| **MARBEFES - Dublin-Liverpool** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 3-7-2023 | 1 | Interview | public authority |
| 4-7-2023 | 2 | Interview & Survey | Academia & research |
| 4-7-2023 | 3 | Interview & Survey | public authority |
| 6-7-2023 | 4 | Interview & Survey | Academia & research |

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| 6-7-2023 | 5 | Interview & Survey | Public audience |
| 7-7-2023 | 6 | Interview & Survey | public authority |
| 7-7-2023 | 7 | Interview & Survey | Industry & private sector |
| 13-7-2023 | 8 | Interview & Survey | Industry & private sector |
| 13-7-2023 | 9 | Interview & Survey | Academia & research |
| 13-7-2023 | 10 | Interview & Survey | Public audience |
| 14-7-2023 | 11 | Interview & Survey | Public audience |
| 14-7-2023 | 12 | Interview & Survey | Public audience |
| | | | |
| **MarineSABRES - Canary islands** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 17-7-2023 | 1 | Interview & Survey | public authority |
| 17-7-2023 | 2 | Interview & Survey | Industry & private sector |
| 18-7-2023 | 3 | Interview & Survey | public audience |
| 18-7-2023 | 4 | Interview & Survey | Industry & private sector |
| 19-7-2023 | 5 | Interview & Survey | public authority |
| 19-7-2023 | 6 | Survey | public audience |
| 20-7-2023 | 7 | Interview & Survey | Industry & private sector |
| 20-7-2023 | 8 | Interview & Survey | Industry & private sector |
| 20-7-2023 | 9 | Interview & Survey | Academia & research |
| 20-7-2023 | 10 | Interview & Survey | public authority |
| 20-7-2023 | 11 | Interview & Survey | public authority |
| 20-7-2023 | 12 | Interview & Survey | Academia & research |
| 20-7-2023 | 13 | Interview & Survey | public audience |
| | | | |
| **MARBEFES - Gulf of Gdansk** | | | |
| **Date:** | **SH number** | **Interview and/or Survey** | **SH Category** |
| 11-9-2023 | 1 | Interview & Survey | Public authority |
| 11-9-2023 | 2 | Interview & Survey | Academia & research |
| 11-9-2023 | 3 | Interview & Survey | Public audience |
| 11-9-2023 | 4 | Survey | Academia & research |
| 11-9-2023 | 5 | Survey | Public audience |
| 12-9-2023 | 6 | Survey | Industry & private sector |
| 12-9-2023 | 7 | Survey | Academia & research |
| 12-9-2023 | 8 | Interview & Survey | Industry & private sector |
| 12-9-2023 | 9 | Interview & Survey | Industry & private sector |
| 12-9-2023 | 10 | Interview & Survey | Academia & research |
| 12-9-2023 | 11 | Interview & Survey | Industry & private sector |
| 13-9-2023 | 12 | Interview & Survey | Industry & private sector |
| 13-9-2023 | 13 | Interview & Survey | Public audience |
| 13-9-2023 | 14 | Survey | Industry & private sector |
| 13-9-2023 | 15 | Interview & Survey | Public audience |
| 13-9-2023 | 16 | Interview & Survey | Industry & private sector |
| 14-9-2023 | 17 | Interview & Survey | Academia & research |
| 14-9-2023 | 18 | Interview & Survey | Public audience |
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# Appendix 5. List of harmonized elements in the interviews

| Harmonised terms | Synonyms |
|---|---|
| Accessibility | user-friendly environment, cultivated landscape, habitability of the islands, limited space in water, limited space in Lagoon, access to cards and nature, freedom (to walk and invite), access to area, visa - free access to Svalbard, accessible |
| Agriculture | cattle, agriculture (cattle farming), agriculture (mainland), nutrients (agriculture), Agricultural run-off, agriculture (tomatoes and mangos), agriculture (eutrophication) |
| Aquaculture | Aquaculture plant, aquaculture (fish farming, fishing), fish-farming, salmon farms, farming salmon, aquaculture (mussels, algae), aquaculture (on land) |
| Awareness / Knowledge | Environmental awareness, awareness for rules & nature, ocean literacy, social awareness, concern with nature, island opportunities, people's awareness, literacy, sensibility to nature, farm to fork, knowledge/awareness, responsibility (stewardship), point of view, awareness dissemination, balanced view of nature, knowledge for public, understanding of nature, expertise, academia, dissemination of scientific knowledge, terrain, knowledge; sensitization; ignorance (= lack of awareness), public recognition, moral obligations, awareness/education, awareness (taking care), knowledge based (want to learn), stewardship / interconnection, creating awareness, to make people aware, care about nature, local knowledge, awareness of the problem, mentality of people, environmental consciousness, lack of consciousness about nature, social acceptance of regulation of flora and fauna, (lack of) awareness, ecological awareness |
| Biodiversity | Species, species richness, fish, Flora & fauna, animals (birds), marine fauna, sea urchins, natural environment (species), flora, fauna, birds, seabirds, eels, limpets, marine resources, marine life, seagrass, turtles, marine species, Posidonia, biodiversity, Marine wildlife, lobster, top predators, whale & dolphin population, bird colonies, fish + biodiversity, fish birds, wildlife, lamprey (species), migrating species (reindeer, whales), seatrout and salmon (diversity), (migrating) birds, tang (seaweed) , tare (kelp), Geese and seagulls, species (fish, prawns, wild salmon), fish (halibut), kelp / seaweed, species (Cod), migratory birds, seals, animals and flora (original), sea-life (whales, polychaetes), walruses, marine mammals, birds, polar bears, beluga's, wildlife (walrus, seals), crabs, sharks, of the island, sea animals, flora and fauna (non-migrating), marine mammals, migrating birds, natural low biodiversity |
| Biological plagues & hazards | pandemic, algae blooms, algal blooms, blue algae (pest.), spring blooms, eutrophication, algal bloom, algae bloom, COVID, disturbance from insects, birds, diseases (salmon lice), COVID pandemic, tropical disease (in fish), pandemic (covid) |
| Bureaucracy, Mismanagement & Bad Governance | favouritism, mismanagement (chaos), fragmentation (of authority), self-earning/profiting |
| Business relations | Competition between colleagues, competition on market (cost efficiency), Cooperation companies, cooperation, competition, association, network, economic cooperation, Latvian fish market, competition (foreign fishers), competition (conflicts) |
| Charismatic landscape | Places of interest, Beautiful beaches, attractive scenery, Charismatic land-seascape (beauty), beauty, aesthetic significance, pristineness, natural heritage, unique places, natural and cultural heritage, beauty of the sea, landscape characteristic landscape, coastal landscape, sea view, habitat (unique, Maërl), Marine environment (pristineness), archipelago (natural environment) pristineness, beauty of natural environment, intrinsic value of the sea (instead of tool, resource), archipelago location (zonation), attractiveness of area (for living and recreation), nature (charismatic scenery), coastal meadows, the aesthetic landscape, El dorado (paradise), landscape, aesthetics (attractive coast), heritage, special place , change of natural landscape, cultural places, islands (pearl) Sobieszevo, Beach (stogi), unique landscape |
| Climate change | rising sea levels, Global change (climate), global warming, climate change (more rain), temperature rise, effects of climate change (storms), temperature rise / climate, |

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| | ecosystem change, increasing temperature, sea-level rise, causes, consequences, warming climate, global change, climate change (rising temp.), (fast rise in temp), (less ice), (Paris treaty), disappearing of the sea ice, sea level rise, climate change (e.g. risk floods, lack of oxygen in water), more bacteria, global change (climate atmosphere) |
| Coastal protection | physical infrastructure (coast protection), wave breakers (small harbour), dikes/polders. beach nourishment, coastal defence, coast protection, coastal protection (floodgates), limited risk of flooding; dike, the dunes (natural coastal protection), Coastal hazard management / Seawalls, Coastal Defences, infrastructure (flood, protection, dams, breakers) |
| Collaboration | collaboration with authorities, synergies, partnerships, private-public cooperation, consultation with ministries, involvement of sector and authorities, art and science collaboration, co-working with science and organisations, cooperation (between archipelago), collaboration with other municipalities, regional (Baltic) connections, cooperation (with universities), regional cooperation, (lack of) dialogue between policy-makers and fisheries, cooperation (with colleagues, researchers), cooperation (with Russian), management (between SH and government), cooperation, stakeholder engagement, stakeholder consultation; monitoring by anglers, contributing, integration, collaboration with science, multidisciplinary teams, consultation |
| Communication | Information, Repository, Integration (of rules), information office, Information (centre for tourist), promotion of area, contact, viewpoints, Consultations, best practises - communication, tourist information, lack of information, feedback / communication (with public), promoting of the island, social media, media, to spread information, Facebook social connection community, informing, sensitizing, imaging, public outreach, Facebook, communication and information, draws attention, communication (spreading info, dialogue), advise, information and communication, communication, information (info plates), promotion of public actions / dialogue, awareness campaigns, proper information, Information on environmental threats |
| Competitor in food chain | cormorants, seal, seals, Sea urchins and seals, sea animals, whales |
| Conflict of interests | conflict of interest, conflicting interests (public vs. private), antagonism commercial vs. recreational fishing, different competing interests (competing interests), conflicts, competing interests, competing for (limited) space, conflict of interest |
| Conservation | Environmental protection (nature), coast protection, nature conservation, protection / preservation of the sea, conservation of nature, nature preservation, preservation, restauration, protection outside MPAs, protection, nature protection, protection of the sea, protection (water), maintenance of nature, environmental conservation, Protecting nature (mother earth), natural conservation, Habitat management (conservation, restauration), preserving of nature (for future gen.), protection/conservation, protection of mammals (seals, walrus), preservation of the sea ice, protecting, conserving nature, environmental protection measures, sufficient protection of bay (legal), protection of nature / conservation |
| Cultural heritage & Traditions | Special events, Culture tradition (conservatism), cultural heritage (nautical), marine history, archaeology, archaeological sites (marine), hospitality traditions, Tradition (cultural heritage), Cultural traditions, cultural events, heritage, traditions, cultural identity, traditional knowledge (experiential), archipelago culture, cultural heritage, traditional way of life, local traditions, Lithuanian culture, traditions (gathering, collecting), (food harvest, passing on skills), gathering berries and collecting eggs, historical long traditions , indigenous values, old traditions, cultural heritage (underwater, coast), heritage (underwater, maritime archaeology), history, culture, individually, collectively, History/culture, cultural value, historical significance of bay, historic coastal towns, short-living memory (disappearing of traditions), traditional trapper life, old settlement (historical significance), church (theological basis), tradition, cultural heritage and traditions, arts, tradition of fishing, underwater heritage (shipwrecks), warfare remaining |
| Decadence | personal financial rewarding system (perverse), greediness (human behaviour), rich fishing tourists |

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| Decision support & Management tools | integrated management models, decision making tools, management plans, multi-criteria model, impact assessments, environmental impact assessment(s), management plan, decision making, Environment impact assessment, Impact assessment |
| Demographics | Generation conflict (young vs. old), aging, generational gaps, young generation, Age (older generation), generation gaps, population decrease, population growing older, generation differences in attitudes towards fishing, generation issues, overpopulation, high population density, brain drain, Demographic issues, long term residents, maximum capacity, the younger generation (kids), climate refugees, generation gap, high population density, new generation, over population, High populated area, Population (density is high) |
| Disturbance | Human impact, noise, route displacement (whales), disruption of nature, light pollution, noise pollution, anchoring, disturbance/destroy, anthropogenic pressure, underwater noise, overcrowding, noise pollution (acoustic), disturbances (from construction), impact of sea farms (disturbance of sediment), impact (farces and waste), horizon disturbance, disturbance of the sea bedding, disturbance (litter, vandalism, park space), recreational pressure (drones, walking), human disturbance, human impacts, human impact (too much), human impact of nature, disturbance by humans, overcrowding, noise and light disturbance, disturbance of the seagrass/nature, anthropogenic pressure, seasonal pressure, damaging (human impact), horizon disturbance (visual ruining), light and noise pollution, sound pollution |
| Diversification | preparation of fish, innovation (alternative activities), diversification of sea-related economic activities, consumption of less vulnerable species, other services, new materials, alternatives, differentiation of tourism activities, regional specialisation, diversification of economic activities, alternative foods (insects) diversification, ecosystem-based approach, diversification of economy |
| Ecological dynamics | Species connectivity (food webs), Biological rest period, reproduction, edge effect (Artenminimum concept), energy flow in food web, natural succession, fish migration, river flow seasonal discharge, dynamic changes in environmental and biological assets, connectivity of spawning areas, predation in food web, Stability (vulnerability) of the ES, man, animal, food cycle, ecology, biomass of species, changes in population dynamics (mortality, fertility), Flight routes, change in species (of commercial interest), short season (nature), nutrients (food for algae), seasonality of nature, top predators |
| Economy | Economic costs, economic growth, Cost-efficiency, prize (costs), blue economy, regional economy, economic impact, local economy, value, local profits, (economic) development, making money, global/local economy, full island potential, blue economy (shipyards), employment, rising fuel prices, economy of coastal communities, high land prices, house prices, maritime economy, bio-based economy, economy (money driven), economic benefits, economic market, economic value, socio-economics, economic interests, economic justice, cost prise, economic prospects, Liverpool economy, socio-economic benefits, consumer benefits, electricity prizes, economy/income, big economy, economy (growth), livelihood, economic profiting, economic interest, making money (economy), prizes, income, costs, high prices, profits / benefits, economic profit, economic pressures (tourism, coastal development), (more) money, investments (close to shore and off-shore) |
| Education | Students, Information, teaching, teach, species identification, schools, studies, environmental education, education (marine curriculum, sail training, secondary school), experimental learning, marine education (biology, history, sailing), marine history, retraining / training, education (ocean literacy e.d.), education (about nature and pollution), education (inform people), students of unis, education (on fish marine), climate education/ecology, Polish education (in general) |
| Environmental rewilding | wilding of the land, overgrowth of landscape, degradation of the area (ES), degradation |
| Erosion | wave damage by sea, coastal erosion, eroding of the coast |

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| Exotic species | Invading species, NIS, species change, invasive species, toxic species, round gobby (invasive species), alien species, new/introducing species (Pink salmon), King crab, Russian salmon, change in species, invasions (urchins, Alaska poll), change of species (cod, eel, sole), other species (snow crab), new species, snow crab (invading), tropical species (new species) |
| Extraction | extraction of raw material, gas extraction, license zones (sand extraction), sand extraction, mining on land (coal), Extraction from nature, coal mining |
| Fairness | equality and fairness, inequality, equal terms, social justice |
| Funding | European funds, subsidies, finances, funds, compensation for fishermen (EU-based), funding (lack of), subsidence (cork money) (SMF), funding and money from mainland, investments, EU funding, (European) Funding, EU-funds |
| Geophysical (water, air, sediment) characteristics | Visibility, Anoxia, sea health, health of ocean (sea quality), clean water, clear water visibility, water currents, water quality, clear water, hydrography, water conditions, water quality (visibility), abiotic characteristics (T, S, O, pH), beach/water quality, salinity, temperature, changes in water characteristics, acidification, change of currents, cold salt water inflow into Lagoon, gyres and currents in lagoon, increased salinity, Water Quality / environmental quality, freshwater quality, salinization, High tidal range, Sedimentary characteristics, air quality, water visibility, clean and healthy fjords, water quality (no oxygen), Vistula river condition, (change in) water characteristics |
| Geopolitics | trans-boundary management, border with Russia (different rules and regulations), international relations, war in Ukraine, Ukrainian war, Russia's humour (international politics), Svalbard treaty and policy, Norwegian sovereignty) (Svalbard treaty), Russian governance issues, war (geopolitics) |
| Habitats | Seagrass fields, beaches, nursery, littoral, marine habitats, landscape (sea / coast), habitats, breeding and feeding areas, beach (coastal system, turtles), beaches , dune systems, coastal dunes, stony habitats, spawning grounds, beach, habitats delta landscape, Lithuanian Coast, terrestrial ecosystem, breeding areas, rivers and lakes, tidal flats, Stones around Wind turbines (habitats), beach and dunes, beach (vulnerable area), polders; Be10 Double: habitat (man, animal), seabed, river, beaches and dunes, estuaries, mudflats, salt marshes, glaciers / sea ice, Mountains and glaciers, habitat for birds, Vistula river mouth islands (habitats), green areas in cities (parks), rivers |
| Harbour | Marina, Port, Industrial harbour, port (infrastructure), harbours, sea port, (expansion of) port, port of Klaipeda, port cargo shipping, harbour of Oostende, Ports, port (commercial freight), port/shipping, harbour facilities (infra), Longyearbyen port/harbour, harbour / port |
| Health & Quality of life | quality of life, healthy life, welfare, well-being (way of life), social prosperity, Wellbeing, exercise, mental health (in society), wellbeing of community, high quality of life, healthy environment (clean water, beaches), Public health |
| Iconic species | Iconic species (Posidonia), Black vulture, sea eagle (emblematic species), important plants, Atlantic salmon, (endemic species) Atlantic salmon, cod, angel shark population, iconic animals |
| Illegal activities | Illegal fishing, hunting, illegal activities (fish poach), development of unregulated angling, illegal fishing (nets), illegal fishing and selling, illegal human activities (dumping in river) |
| Implementation & Control of Rules | Control of coastal area, control (fines, rules), Enforcement (of rules), , law enforcement, enforcement of rules and regulations, implementation (follow-up), putting words into action, enforcement, enforcement of rules, controls, inspection, law enforcement (monitoring, willingness), control (enforcement, punishment, implementation), monitoring of activities, control, monitoring, border guards, control (regulation), monitoring and assessment of Protected Area, decision making, control / checking cards, impact law, implementation, control and monitoring, monitoring systems |
| Income & Employment | Income (economy), employment (investment), employees and employment, job availability (employees), livelihood (income), livelihood, income, job prospects and higher education, jobs, job security, future job opportunities, wake living (livelihood), |

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| | labour market, education, employment opportunities, food demand, make money, income / workplaces, income, employment, earning money, Work (needed) |
| Industry | Polluter, industrialization (upscaling port), industry (technological, in harbour, chemical), airport, companies, enterprises, big business, mining (deep sea), shipping industry, industrial area (power plant), olive oil industry, industrial zone, salinity plant, boat-building industry, industry (oil, gas), ship building industry, industry (all), mining (oil, metals), Industry (ship companies), industry (sand, cables and tubes), industry (sand extraction), Industry (sand mining), industrial activity, industry sectors: (fishing, petrol, shipping), coal industry, coal mines, tourist industry (Hurtigruten), Energy supply, energy plant (with coal), cruise industry (big boats), desalination plants, tourist industry, business stakeholders big |
| Infrastructure & Transport | Pathways for ships, Sea route, transport, Shipping lane (transport), marine traffic (boats), LNG infrastructure, transport (longer travel time), flights, dam, hotels and roads, airport and harbour, rivers, infrastructure for transportation, infrastructure of port, airport, underwater activities (energy cables), transport by ships, electric cable, infrastructure, marine traffic, underwater infrastructure (cables), waste depots, traffic (cars), parking infrastructure, ferries, cruises, public transport (ferries), shipping lanes, shipping routes, dirt roads, electronic charging stations, (fish unloading docks), infrastructure for port, Coastal traffic, cables and tubes, shipping, ship routes, infrastructure (buildings), water ways (canals, streams), Under water cables, Cable infrastructure, Ferry routes, infrastructure development, infrastructure (roads, energy, IT, Harbour), pathways for ships and boats, planes / airport, sewage pipelines, bike roads parking places (infrastructure), traffic (car and ferry), traffic jams, infrastructural development, tourism infrastructure |
| International governance | European authorities (Governance), EU rules, EU/international rules and regulations, quota, EU governance, EU/UN targets. EU policy, European directives, EU policy, EU framework (WFD 2000/16), EU legislation, governance, HelCom, Baltic/international cooperation, EU commission, international/EU-level governance, WFD ocean mission, biosphere reserve program, international rules and regulations, (unfair) quota system, European rules and regulations, regulation quota's, permits, quota on crabs, EU- regulations , European regulations, European norms (OSPAR), International regulations, EU guidelines, climate goals, EU directives, birds and habitats directive, international rules, politics (international), Paris agreement (international rules), fishing quota (tuna), international legislation, ICAT (international committee Atlantic tuna fishery), legislation, law European |
| Intrinsic value of nature | Intrinsic value of the sea, non-monetary value, environmental justice, nature values, valuation of ES (non-monetary), nature value, economic valuation of nature |
| Isolation | Isolated location, Unique, remoteness of the island, unique location (far away) |
| Large-scale fisheries | Commercial fishing, Fishing, Trawling, Large amount of fishing instruments, large scale fishing, fisheries, multi-species fisheries, trawling fishing, fishing (industry), large scale fisheries (legal), fishing industry, fishing (commercial), commercial fisheries, large-scale fishing (on halibut, long lines), fishing industry and farming, fisheries (outside at ocean (trawlers)), fishing (trawling), commercial fishing sector, overseas fisheries (big trawlers), fishing (outer seas), (out the coast) fisheries, professional fisheries |
| Large-scale tourism | Mass tourism, tourism (persons), beach, international, pleasure, relaxation, seasonal tourism, Cruise-tourism (mass), cruise, sail boats, charter touristic boats (mass tourism), massive tourism, tourism, over tourism, seasonality (of crowds, tourism), tourism industry, maritime and coastal tourism, recreation, high tourism in summer, cruise ships, cruise liners, mass-tourism, cruise/mass tourism, cruise industry (big boats), cruise ship tourism (cruise industry), cruise ships (big), cruise tourism, Big cruise ships, Tourists, tourism sector, visitors, large-scale (mass) tourism, (seasonal) tourism |
| Law enforcement bodies | Management with wide mandate, Coast guard, Police, public authorities, Institution (coastal guards), environmental protection (society), coastal guard institution, controlling bodies, coast authorities, port authority, authorities (coast guard etc.), coast guard / law enforcement, port authorities, defence (land+air) |

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|---|---|
| Littering | Waste, Plastic, garbage, nets, marine litter, debris, litter, rubbish, rubbish from boats, beach wrack (litter flushed on beach), littering waste, garbage / waste, Littering including fishing gear, waste / garbage, littering and garbage, trash problem |
| Local fisheries | Artisanal fisheries, Local fishing, Fishing, small scale fishing, professional artisanal fisheries, coastal fisheries, fishing activities, artisanal fishing , fisheries (recreational), fishing (small scale), small-scale fishing, (coastal) fisheries (small boats), local fishermen, coastal farmers fisheries (artisanal fishing), fishing (commercial) in local area, Fishing (artisanal, local, salmon), angler fisheries, Small scale fisheries/handpicking, fishing (own, small), artisanal fishing sector, fisherman/fish population, local fisheries, Fishing/small scale, small fisheries |
| Local governance | Policy (park), Community governors, licensing (in- or outside region), local administration, administration agency, coordination, management (rules, laws, regulation), local authorities, government (decisions), island level management, politicians, policy makers, regional policy, management, management of fisheries, legislation (tools), decision makers, municipality, local rules & policy, regional governance, central governance, municipal governance, local authority, local government, policy, regional government, local government/town council, mandate (local), majors programme, regional governance (ELY centre), licenses (for boats), local municipalities, "local governance, municipal transport, paid parking", water management body, government, government-regional-Finn mark, local rule markers, decision-making (governance), flanking policy, local policy (regional policy), governor, governance / politics, sysselmester, politics (change frequently), political reasons, administration, local government, town hall politicians, managing a good balance, local authorities/policies, local governments/regulations |
| Local market | Local products, market (local produced), local market, direct sales, local fish market, Low prices |
| Local rules and regulations | regulations (local), Permits & Licences, laws (rules and regulations) local regulations, laws, rules, licences and permits, legislation, licensing, permits, tourism management, regulation, restricted development, building restrictions, coastal stripe law, fishing ban (Cod, Salmon), local rules for fisheries (e.g. sanitary requirements too strict), regulation of equipment and materials, fishing licences, permits (conditions), rules and regulations (pre diggings, scans), restrictions of activities, rules and regulations, licences, restrictions, regulations and permits, governance regulations, proper guidelines (rules and regulations), local rules, regulations, license and permits |
| Maintenance | Maintenance (degradation), Public structures, dredging, upkeep of buildings, houses, enhancement dredging, cleaning, Aging facilities (= lack of maintenance) |
| Marine resources | Fish stocks, resources (opportunities and limits), resources (whales), natural capital, species of commercial interest, fish as food, natural resources, resources from the sea, fish stocks (in general), cod stocks, Fish population, halibut, cod (original fish), cod and halibut, original fish population (Atlantic salmon, cod), fish (halibut, cod, shrimps, King crab), demand for energy, food and other resources, Shellfish stocks, bluefin tuna, fish, cod (fish) |
| MPA management | local management (MPA), management (actual), park management, management (of PA), environmental managers (body), Marine management |
| Multicultural & Indigenous society | the Sami society, indigenous people (Sami), national cultural diversity, multicultural society, society of Svalbard - Non-Norwegian |
| National governance and policy | Politics, national management, Policy (governmental and public support), laws (rules and regulations), politicians, national/regional politics, government (politics), governance in general, political cycles, politicians, government, legislation (nat.), national government, management of fisheries, (mis)management of fisheries, mismanagement, national rule makers, short term politics (populism), legislation, inland fisheries agency, government policy, National borders - Authorities Wales/UK, Government agency UK, Marine Management organisations, UK/Wales government, governmental ministry, ministries (justice, education, environment, etc.), Svalbard white paper (planning), politics (national), legislation (region, nation, EU), policy, policy actual |

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| National rules and regulations | Rules, National, EU (differences), Rules and Regulations, administration (agency) national regulations, expropriation (of land), emission quota (incl. self-auditing - ISO norms), precautionary principle, restrictions (in general), regulations, national laws and regulations, legal boundaries, map-act, regulations and quota, national laws, regulations (EU, Local) |
| Natural hazards | flooding, flooding by rivers, extreme conditions, heat waves, water level changes (flooding), frequency of storms, forest fires risk, storms, more storms, Risk of floods and storms, meteorological events |
| Nature | Ecosystem, Environment, sea, natural value, natural environment, coastal environment, marine (coastal) ecosystem, environment, ocean, nature (biodiversity/environment/sustainability), marine environment, rivers, Maritime habitats (and species), coastal ecosystem, archipelago (nature), Baltic sea, coastline, nature (archipelago, ecosystems), sea (environment, nature), coastal region, air quality, the ocean, fjord systems + rivers, the fjord, sea and fjord, Porsanger fjord (system, 4 rivers),food chain, Belgian coastal zone, nature / ecology, nature (coastal area), nature (dunes, sandbanks), ecosystem (nature), Nature (marine environment, wildlife populations), River estuary, Mersey river, estuary, Mersey estuary, marine environment quality, healthy seas, health of Dublin Bay, Dublin Bay environment, Dublin Bay, nature/environment, fjord/nature, fjord system wilderness (untouched), healthy nature, nature/environment/use of nature ES, Svalbard nature, Environment (kings bay), advent fjord, sea/nature, ecosystem (healthy), wilderness (pristineness), the coastal environment, Gran Canaria, bay of Gdansk - environment, nature (water, beach, Baltic shore), stability of nature (peninsula) |
| Nature experience | Contact with nature, Admiration, Pleasure, enjoyment, emotions (aesthetic service), Enjoyment (nature, environment), Spiritual significance, natural experience, engagement with the ocean, relaxation, connection to nature, peacefulness, refuge, quietness, enjoying nature, connection with & sensitivity for nature, learning from nature |
| NGOs and Museums | science centre, Aquarium, environmental organizations, proper strandlopers (NGO), NGO fair seas, Nature conservations NGOs, the museum, diving club (non-profit), environmentalists (green people) |
| Overexploitation | Human impacts (overharvesting), overfishing, (over-)harvesting, overfishing (extraction of the sea), extraction from nature, exploitation (greediness), decadence, consumption, bycatch, overexploitation of marine resources, exploitation of Svalbard, Products (too many), deforestation |
| Political trust & Good governance | transparency in governance, political trust (consistency), confidence of authorities, governance quality, trust in governance, political will, clarity, transparency, political reasons, governmental fairness, political debate, responsibility |
| Pollution | Chemical wastes, eutrophication, plastic, metals, contaminants, contamination, emissions, environmental impact (on seabed, reefs), waste, eutrophication, human impact (barriers), micro-plastics, chemical, oil spill, pool water, waste water, waste water from hotels and industry, sewage, waste (sediment, substrate, biological), plastic waste, waste water from hotel and ships, pollution (plastic, waste water), eutrophication, human impact, litter, environmental problems, microplastic, pollution (nutrients, wastewater, phosphorous, chemicals, fertilizers), nutrients, water pollution, air pollution, fertiliser, manure, odour pollution, human waste, oil spills, pollution river water, rivers pollution, point sources, toxins (accumulate, microplastics and hydraulic oil, Pollution (chemicals and paint), pollution by dying fish, nitrogen, phosphorus problem, enrichment of nutrients, emissions (carbon), nutrient inputs, marine pollution, garbage, pollution (plastics), pollution (impacts), plastic pollution, plastic/garbage, pollution in the sea, deposition of heavy metals, external pressure, Vistula river outflow of nutrients (eutrophication), nutrients or other pollution (drop-off) |
| Protected Areas | National park, restricted area, preservation area, MPA, restricted area access, natural Protected Areas, nature parks, biosphere reserve, marine reserve, natura 2000, natural parks, partially protected status, biosphere (archipelago), nature park, UNESCO site, Curonian Lagoon, PA, protected area (national parks), marine protected |

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| | areas, designated areas (SPA's, SEA's), nature reserve PA's, national parks, natural park, nature protection (Natura 2000), protected areas/nature state |
| Public opinion | community oversight, public image, media, Hope, will to change to better and preserve healthy nature, scepticism of people, local resistance against industrial development, public perception (critical mind), Support (social), signs, positive pressures to keep ocean clean, public acceptance, society/public opinion, social acceptance, protest action, public opinion (changing for the better), climate activism, lying |
| Public participation | Citizen science, Participation (citizens, community), social integration, participation (societal relations), community participation, bottom-up, monitoring (data), volunteers (campaigns), local interest, public involvement, participation - compromise, beach clean-up, environmental action, public participation (boy scouts, beach clean-up), participatory culture (co-productions), willingness of people to do something for nature, people participation, engagement (of locals), social acceptance (public participation), cleanliness, public engagement, Mersey clean up, people involvement / beach cleaning, involvement, garbage collection (public participation), involving stakeholders, cleaning up activities, social initiatives, co-creation process (cooperation / dialogue with SHs) |
| Recreation & Leisure | Active recreation, Recreation (diving), Spear fishing, Dive, Snorkel, Diving, Sports, Hiking, Recreational fisheries (angling, spear-fishing), sport (fishing), nature photography, fisheries (sports, nautical), surfing, whale watching, diving tourism, photography, birdwatching recreation, diving activities, scuba diving, recreational fisheries, recreational activities , activities on land/sea, boating activity, fishing (recreational), recreation (boat activity, sport, sailing, summer cottages), wind/kite surfing, bird watching, pleasure yachts, recreational fishing, artisanal fishing, kiting, tourist fishing, fishing (whenever I want), fishing (recreational)(touristic), recreational fishing (crab sales), bird watching and other activities, recreation and sport, water recreation (diving, surfing), recreation (water), Bird watching/ dog walking, water activities, Football/recreation, recreational fishing (angling); recreation (walking, swimming), outdoor activities/recreation, private fisheries (recreational), leisure/adventures, maritime activities, hobbies, nautical activities, sportfishing, small boat tours, tourism activities, recreational activities (e.g. wind, kite, sailing), (winter-swimming), entertainment (water sports), touristic fisheries, wind surfing |
| Regulatory & Provisioning ES | carbon sequestration, ecosystem services (food, relaxation), indicators - ecosystem services (provisioning), ecosystem services |
| Renewables | wind energy, Geo-thermal, tidal renewables, renewable energy sources, windmills, renewables (wind, tidal), renewable infrastructure (wind energy), modernisation (electricity, solar panels), windmills and cables, wind turbines, threat of windmills (visible power cables), renewable energy (wind, water mills), renewables (wind power), renewable energy (windfarms at sea), blue energy, wind turbines, Wind power plants, license zones (energy), renewable energy, renewable energy (e.g. offshore wind), renewable energy (e.g. offshore), Tidal energy plant, wind farms, , new energy sources, wind mills, energy transition (green & nuclear energy), off-shore wind farm |
| Research | Research Institute, Environmental Institute, Research opportunities, science (projects), EU projects, regional projects (Spain, Cantabria), investigation, studies, research (university), data, studies and research (university), Research on knowledge gaps, expert involvement, science, environmental projects (EU, educational), monitoring rain and air quality, pathogenic, research, scientists, studies and research, research (university, fieldwork), scientific knowledge, research (on kelp), monitoring (of data), knowledge, references, Base info (data, knowledge), recreational fisheries monitoring, Pollution monitoring, Monitoring fish, Monitoring, models, Research activities (in/around Dublin bay), educations and schools, consulting institutes (external research), scientists, science and education, science monitoring, sea sighting, collecting data, university, research centres, research / citizen science |
| Resilience | recovery of the system (resilience), stability (calmness), vulnerability of nature, nature recovery zones, climate resilience |

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| Respect | Respect for natural environment, Respectful behaviour, responsibility for the environment, respect for nature, pride of natural environment (archipelago), respectful behaviour, sustainable respectful behaviour, Care about nature, Accountability, Respectful behaviour, respect and trust, reflection, take care (for nature), caring for nature, change in people's habits (for the better), own responsibility of tourists/citizens |
| Restoration & compensation | Compensation (of Nature), restauration, biophysics recuperation / soil restauration, climate compensation, restauration of natural habitat (fish comes back), restoring the environment, restauration of original landscape, climate compensation (CO2 mitigation), compensation (new bird island) |
| Risk and Safety Management | Safety management, Risk Assessment, Emergency care, safety, crises management, water management pumping stations, fire protection, health+safety rules (HMS), enough safety, security/safety, capacity (emergency response), risk and safety management (falling rocks), security monitoring system |
| Sanitation | Waste management, sanitation (of waste), waste water treatment, sewage plants, waste water plants, wastewater treatment deficiency, cleaning of waste water, wastewater treatment, climate positive alternatives, sewage, tackling the source, waste management facility, River clean-up, waste water management, cleaning the water, Waste water infrastructure (sewage), waste treatment |
| Seasonality | Part-time residents, seasonality, seasonality of activities (tourism), seasons (economics) ice, winter, part-time residents (summer cottages), summer residents, seasonal habitation (low in winter, high in summer), seasonal restrictions, seasonal overcrowding, seasonal tasks (8 seasons), parttime residence (holyday houses), seasons (dark / light), seasonal companies, summer time peaks (with tourists), short term residents, people coming and leaving (part time residence), seasonality (short season), summer residents (Polish people), economic seasonality |
| Sense of community & Identity | Cultural identity, Island society, Local identity, social cohesion, local identity (value of island), authentic, cultural identity (traditions), maritime identity of the population, maritime identity of the city, social congregation, community identity, the way we think and act, social cohesion, integration, love for Svalbard (Bolyst) |
| Small-scale tourism | Recreation (tourism), bird watching, tourism (eco-/pesca), tourism (diving), quality tourism, fishing tourism, active tourism, pesca/small tourism (recreational), local sustainable tourism, tourism, tourists, visitors, Coastal Tourism, Recreational boating, tourism (staying at city), local tourism, expedition vessels (SME's), expedition cruising, land-based tourism (visiting SME's), eco-tourism, small-scale "slow" tourism, sustainable tourism |
| SME | Restaurants, Company, Business, Guesthouse, diving school, B&B, shop, nature photography, seaweed company (SME), local economy (companies, SME), SME associator, whale watching SME, diving centre, Tourist operator (dive), hotels, apartments, tourist apartments, business, bars, ships, hotels and apartments for tourists, artificial reef parks (recreational diving), Boating sector/industry, diving schools, restaurant, economics: fishers, hotel industry, private consultancy for fisheries, tour operators, companies (connected to tourists), local enterprises, tourist industry, tourist companies, hotel, fisheries (SME), seaside resort, hotels and restaurants, Liverpool docks/training facility, other shops in town (SME), other local companies, company (small boats, guides, new businesses (SME's), commercial businesses (SME's), whale watching (SME), shop / company, local business, tourist industry (SME's), tour guides (environmentalists), tourist companies small, gastronomy and hotels , hotels and resorts, "demands, shops to sell fish", big hotels, hotel/restaurant owners, companies (SME), small scale business |
| Society | Citizens, societal impact, society in general (sports, sailing), Society (value), local population, consumers, community, society - all actors, inhabitants, residents, resident populations, local society, family, villagers, permanent residents, society (humans), local inhabitants, (needs of) society, Porsanger commune, community of Porsanger, population, local society (Porsanger), local community (village), local residents, social cohesion, inhabitants of coastal areas, population (human), coastal communities, people of Dublin, society town, people, society of Svalbard - |

| | |
|---|---|
| | Norwegian, local people, population/society, Longyearbyen culture/society, Svalbard society, local citizens, small town/villages, local community interests |
| Spatial planning | Zonation (accessibility of area), fragmentation (of uses, space), limited space, marine spatial planning, zonation (of rules), upscaling of the PA's, long term spatial planning, Zonation (hot spots), spatial planning of diving and wind parks, zonation, zonation of diving parks, spatial planning / coastal management, zonation (closed area), marine spatial planning (management, offshore wind farms), spatial planning, zonation in protection, spatial planning initiatives, spatial planning (good), too much planned (spatial planning), lack of space (spatial planning), restricted zones, fragmentation of nature, (bad) spatial planning, transboundary MSP, Irish sea region, strategic planning |
| Staff & Equipment | Resources, Staff, boat, efficiency with equipment and operators, facilities, human resources (staff at institutes), nr. personnel (capacity), limited resources (human to actual tool), Human resources (staff, stability), expertise |
| Strategic plans | integration (long term strategies), leverage, future coast view (80-year plans) (aims and goals), lobby, advocacy, plan for the bay of Gdansk |
| Strategic position | connectivity, favourable (central) location, crossroads of Europe |
| Sustainability | Sustainable balance, sustainability activities, sustainability development, sustainability (ecological), co-existence (activities with nature), within ecological limits (sustainability), certification, sustainable food choices (local, wild), recycling, sustainable development, sustainable foods, sustainable use of resources, self-sufficiency, equilibrium (balance) |
| Technology & Innovation | sustainable / eco-friendly material, forecast models (research), environmental materials and lifestyle, eco-products, hazard monitor system, innovation (artificial reef), increasing of tech and innovation, alternative solutions (gypsum/lime), nature friendly innovation, innovation waste management, electrifying transport, new technology, innovation, nature based solutions, technology, hybrid boats, technology and innovation, turn to renewables (hydrogen fuel in boats), (lack of) practical solutions, gas storage brine |
| Trade & Transport | Export of fish, products (export), ships, traffic movements, commerce, cargo, trade and travel, transport and maritime sector, export of crab, Ship traffic, shipping, marine traffic, cargo/bulk, export, transport, maritime traffic, trade, Transport gas, oil, containers, transport of goods/containers |
| Urbanisation & Coastal development | urban pressure (development), public buildings, housing, houses, city semi-rural, inhabitation, development of hotels, construction (houses) impact coast, adding to nature, holiday houses, real estate development, coastal urban development, property development, privatisation, urbanization, urbanisation along the coast, ocean sprawl (windmills, aquaculture), housing/living functions, coastal development (buildings), High population density, urban development, development of the town, growing city (urbanisation), building constructions on the coast, buildings, hotels, big cities, New buildings (coastal development), development of building, buildings (new hotels) development |
| Weather | weather (wind, waves, temp, currents), seasonal shifts, unpredictability, weather conditions, seasonal changes (wind, temp), climate, heavy weather, harsh climate, extreme weather conditions, weather stability |

# Appendix 6. List of elements in the surveys

What is the importance of the following elements in your coastal area?

| 1. | **Structures and Functions of coastal ecosystems** | | **Rate the importance, from 0 to 5**<br>0 = not present, I don't know, no opinion<br><br>1 = absolutely not important<br>2 = not important<br>3 = somewhat important<br>4 = important<br>5 = very important | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Elements** | **Specification / including** | **0** | **1** | **2** | **3** | **4** | **5** |
| 1 | Biodiversity | diversity of plants, animals, fungi | | | | | | |
| 2 | Element/nutrient cycle | carbon, nitrogen, oxygen, water purification | | | | | | |
| 3 | Food chain energy transfer | energy pyramid, food web, primary and secondary production | | | | | | |
| 4 | Habitats | breeding / feeding grounds / finding shelter / growing area | | | | | | |
| 5 | Hydrodynamics | natural water flow, tidal flow, waves, currents | | | | | | |
| 6 | Population dynamics | gene pool, species distribution, predation, reproduction | | | | | | |
| 7 | Sediment characteristics | soil composition, rocks | | | | | | |
| 8 | Water surface characteristics | temperature, salinity, turbidity | | | | | | |
| 9 | Resilience | potential of the ecosystem to recover from change or stress | | | | | | |
| 10 | Weather | temperature, sunshine, rain, evaporation | | | | | | |
| 11 | Land- and sea-scape | overall layout of the surroundings, sea-view, countryside | | | | | | |

What is the importance of the following elements in your coastal area?

| 2. | **Ecosystem Services** | | **Rate the importance, from 0 to 5**<br>0 = not present, I don't know, no opinion<br><br>1 = absolutely not important<br>2 = not important<br>3 = somewhat important<br>4 = important<br>5 = very important | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Elements** | **Specification / including** | **0** | **1** | **2** | **3** | **4** | **5** |
| 1 | Biodiversity conservation | natural conservation of species, habitats, and genetic resources | | | | | | |
| 2 | Charismatic landscape | iconic scenery | | | | | | |
| 3 | Charismatic species | iconic plants, animals | | | | | | |
| 4 | Climate regulation | carbon sequestration, water retention | | | | | | |
| 5 | Education and research | opportunities for education and research | | | | | | |
| 6 | Energy production | water, wind, solar, geothermal | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| 7 | Flood and coastal protection | deltas, marshes, dunes | | | | | | |
| 8 | Elements for aquaculture | Available nutrients and fodder for sea farming | | | | | | |
| 9 | Food provision for humans | opportunities for fishing, algae extraction | | | | | | |
| 10 | Leisure activities | opportunities for recreation, water sports, hunting | | | | | | |
| 11 | Pollination and dispersal of reproductive cells | seed dispersal, larval transport | | | | | | |
| 12 | Water regulation | fresh water, water storage, supply of drinking water | | | | | | |
| 13 | Raw material | opportunities to extract sand, gravel, shell, amber, salt. gas, oil | | | | | | |
| 14 | Provision of drugs and chemicals | Pharmaceuticals, medicine | | | | | | |
| 15 | Disease and pest control | controlling outbreaks. prevention of jellyfish blooms | | | | | | |
| 16 | Spiritual significance | religious and non-religious value | | | | | | |
| 17 | Aesthetic significance | appreciation of natural surroundings, beauty of environment | | | | | | |
| 18 | Natural infrastructure | water routes, natural shipping lanes, transport facilitation | | | | | | |
| 19 | Waste and Toxicant mediation | wastewater treatment, preventing nutrient enrichment, denitrification | | | | | | |

How strong is the relationship between the following elements and your coastal area?

| **3.** | **Socio-Economic** | | **Rate strength of the relationship, from 0 to 5**<br>0 = none, I don't know, no opinion<br>1 = very weak<br>2 = weak<br>3 = moderate<br>4 = strong<br>5 = very strong | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Elements** | **Specification / including** | **0** | **1** | **2** | **3** | **4** | **5** |
| 1 | Income | wage, payment, salary | | | | | | |
| 2 | Traditional livelihood | subsistence fishing, food-and resource collecting, handicrafts | | | | | | |
| 3 | Economic welfare | prosperity of area, wealth | | | | | | |
| 4 | Sustainability of economic prospects | future job security | | | | | | |
| 5 | Equal access to services, goods and benefits | fair distribution of resources and opportunities | | | | | | |
| 6 | Immigration | attracting permanent residents | | | | | | |
| 7 | Emigration | departure of permanent residents | | | | | | |
| 8 | Domestic tourism | tourists from own country, local recreation | | | | | | |
| 9 | Foreign tourism | international, tourists from abroad | | | | | | |
| 10 | Trade | industry and commerce, fish auction and processing | | | | | | |
| 11 | Transport and infrastructure | port, ship traffic, ferries | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| 12 | Extraction of raw materials | sand, gravel, shell, amber, salt, gas, oil | | | | | | |
| 13 | Large scale fisheries | pelagic and benthic fishing, trawling | | | | | | |
| 14 | Small scale fishing | local artisanal fishing | | | | | | |
| 15 | Aqua-culture | clams, mussels, algae, seaweeds, farmed fish | | | | | | |
| 16 | Infrastructural buildings | Bridges, dams, dikes, roads | | | | | | |

How strong is the relationship between the following elements and your coastal area?

| **4** | **Socio-Cultural** | | **Rate the strength of the relationship, from 0 to 5**<br>0 = none, no opinion, or I don't know<br>1 = very weak<br>2 = weak<br>3 = moderate<br>4 = strong<br>5 = very strong | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Elements** | **Specification / including** | **0** | **1** | **2** | **3** | **4** | **5** |
| 1 | Sense of community | social cohesion, positive interpersonal relationships | | | | | | |
| 2 | Traditions | traditional way of life, rituals or celebrations, folklore, dress, local language/dialect | | | | | | |
| 3 | Sence of place | attachment to local coastal environment, or to a specific coastal landmark/site | | | | | | |
| 4 | Cultural sites and monuments | historically significant architecture, lighthouses, shipwrecks | | | | | | |
| 5 | Sport | beach- and water sports | | | | | | |
| 6 | Relaxation | unwinding, peace of mind, rest, recovering | | | | | | |
| 7 | Amusement | fun, pastime | | | | | | |
| 8 | Awe | admiration, wonder, respect | | | | | | |
| 9 | Health | mental and physical well-being | | | | | | |
| 10 | Reflection | contemplation, inspiration | | | | | | |

To what extent are the following elements present in the governance in your coastal area?

| **5a** | **Governance** | | **Rate the level, from 0 to 5**<br>0 = not present, I don't know, no opinion,<br>1 = very weak<br>2 = weak<br>3 = moderate<br>4 = strong<br>5 = very strong | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Elements** | **Specification / including** | **0** | **1** | **2** | **3** | **4** | **5** |
| 1 | Inclusiveness | opportunities to participate in decision-making | - | | | | | |
| 2 | Transparency | visibility and verifiability of decision-making, provisioning of information | | | | | | |
| 3 | Corruption | abuse of power, fraudulence | | | | | | |
| 4 | Fairness | equal treatment, consistency of decision-making | | | | | | |
| 5 | Advocacy | cooperation of government and sector | | | | | | |
| 6 | Innovation | pilots, trials, new ideas | | | | | | |
| 7 | Accountability | government officials are answerable, can be challenged | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| 8 | Governmental resilience | ability/flexibility of government to respond to emergency or future changes | | | | | | |
| **5b** | **Governance - Rules and Regulations** | | | | | | | |
| 1 | Local laws and regulations | rules and directives, emission quota at local level (city, district) | | | | | | |
| 2 | National laws and regulations | rules and directives, emission quota at national level | | | | | | |
| 3 | International laws and regulations | rules and directives at European and global level (EU, UNESCO, MSFD, GES), | | | | | | |
| 4 | Local licenses and permits | requirements and permissions for activities and ventures from local authorities | | | | | | |
| 5 | National licenses and permits | requirements and permissions for activities and ventures from national authorities | | | | | | |
| 6 | Rules and regulations around Marine Protected Areas (MPA) | designated protected areas of the ocean, Natura 2000 | | | | | | |
| 7 | Climate goals | Paris Agreement, Kyoto Protocol, reduction of emissions e.g. greenhouse gasses | | | | | | |

To what extent are the following elements pressures in your coastal area?

| **6** | **Pressures** | | **Rate the level, from 0 to 5**<br>0 = not present, I don't know, no opinion<br><br>1 = very small extent<br>2 = small extent<br>3 = to some extent<br>4 = large extent<br>5 = very large extent | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Elements** | **Specification / including** | **0** | **1** | **2** | **3** | **4** | **5** |
| 1 | Outbreaks of pests and diseases | avian flu, fish cancer, toxic algae blooms | | | | | | |
| 2 | Extreme weather | flooding, storm surges, mudslides, local extreme rainfall/droughts, wildfire | | | | | | |
| 3 | Eutrophication | enrichment in nutrients of the soil or waterbody | | | | | | |
| 4 | Change in species | plants and animals appearing and disappearing, invasive species | | | | | | |
| 5 | Climate / Global change | temperature rise, rising sea-levels, acidification, deoxygenation | | | | | | |
| 6 | Illegal human activities | poaching, illegal dumping, illegal constructions | | | | | | |
| 7 | Mismanagement | lack of responsiveness, enforcement, and acknowledgement | | | | | | |
| 8 | Change in land/sea use | expanding the area for aquaculture or ports | | | | | | |
| 9 | High population density | overcrowding, overuse | | | | | | |
| 10 | Civil engineering | impact caused by bridges, windmills, dikes | | | | | | |
| 11 | Public opinion | activism, media | | | | | | |
| 12 | Pollution | waste water, aerial depositions, toxins, chemicals, hormones | | | | | | |
| 13 | Local human disturbances | littering, light, vibration, noise | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| 14 | Large-scale disturbances | drilling, dredging, light, noise by maritime shipping | | | | | | |
| 15 | Neglect of maintenance | lack of conservation and support | | | | | | |
| 16 | Part-time residency | seasonal tourism, peak loads, competition on housing market | | | | | | |
| 17 | Tourism | recreation, visitors, travellers | | | | | | |
| 18 | Sea mining | extraction of sand, gravel, gas, oil | | | | | | |
| 19 | Overfishing and overexploitation | unsustainable fishing, depletion of fish, sea mammals and aquatic plants stocks | | | | | | |
| 20 | Urbanization | expansion of housing and infrastructure in outer territories | | | | | | |
| 21 | Habitat loss | habitat fragmentation, loss of connectivity, reduction of salt-marshes | | | | | | |
| 22 | Horizon disturbance | Visual ruining, skyline destruction, wind-mills and high-rise buildings | | | | | | |

# Appendix 7: Additional survey questions

| ADDITIONAL SURVEY QUESTION | Your answer |
|---|---|
| **PART I - MANAGEMENT** | |
| 1. What are the most relevant threats/problems for marine biodiversity in your area? | |
| 2. Would you change the (environmental) management of this area? If so, how and why? | |
| 3. Why do you think the management you suggest has not been implemented yet? | |
| 4. Are there divergent opinions between interests groups about the management of the area? | |
| 5. Is any (marine) ecosystem natural capital accounting implemented at the national or the local scale in this country? If so, who is/are the leading institution(s)? | |
| **PART II - TOOLS** | |
| 6. Describe the decision support tools and the questions they help to solve | |
| 7. If you have, please describe the tools and the questions they help to solve. | |
| 8. What Decision-support tools are available even if you do not use them? What questions are you trying to solve using these Decision-support tools? | |
| 9. What tools that help to address welfare or environmental and socio-economic issues are developed for your area? | |
| 9.a. What problems can these tools (question 12) help to solve? Please, identify some topics/questions/problems. | |
| 10. In your opinion, are there key gaps where a new tool is necessary? | |
| **PART III - RULES AND REGULATIONS** | |
| 11. What are the main regulations (global, EU, regional, national, local) that you are faced with that influence your work (decision making, planning, target setting, stakeholder engagement, etc.)? | |
| 12. How do you perceive the functionality and operationality of these rules and regulations? Rate each rule from 1-5, 1=poor; 5=great | |
| 13. Specifically with regard to biodiversity and ecosystem services, what are the most important rules and regulations you are faced with? | |
| 14. How do you perceive the functionality and operationality of these rules and regulations? Rate each rule from 1-5, 1=poor; 5=great | |
| 15. What laws are you aware of within your sector/daily activities | |
| 16. What, if any, other guidance exists in the area that influences your work (e.g. guidelines, strategies) | |
| 17. What are the primary governing bodies (institutions, agencies, etc.) and other actors (research community, civil society) that are important for-, or that you have contact with, in your work? | |
| 18. What are the primary roles, functions, and activities of these bodies? How do they interrelate to you/your sector/your institution? | |
| 19. Are you aware of any *additional* European, national, regional and local rules and regulations that concern the governance and management of biodiversity and ecosystem services? If yes, please list them in the table below. | |
| 20. Which, if any, Decision Support System do you use at the moment? | |
| 21. Which, if any, Ecosystem Services concept do you use at the moment? | |
| 22. Are you working with MPAs (Marine Protected Areas)? Yes/No | |
| 23. Are you concerned about MPAs? Yes/No | |
| 24. If YES, could you please indicate what the main challenges are in regard to MPA (e.g. design, implementation, identification)? | |

# Appendix 8. Indices for most important elements at research areas

Indicated are the indices for the most important elements in each research area.
Indices are explained in Table 2.

Selection criteria to be adopted as an important element, included:

- 1) the frequency an element was mentioned among stakeholders had to be at least 50 % among the interviews taken in a research area (green emphasised cells)
- 2) the number of connections (vectors) from or to an element had to be equal or higher than 50 % of the maximal number from/to an element obtained in that area (blue emphasised cells)
- 3) the centrality of an element, i.e. the strength it was connected to other elements, had to be equal or higher than 50 % of the maximal strength from/to an element obtained in that area (yellow emphasised cells).

Next to the main selection criteria a couple of indices narrowly related to the total number of connections and centrality are indicated, being:

- related to 2) the number of connections (vectors):
  - 2a) the number of transmitting connections
  - 2b) the number of receiving connections
- related to 3) the centrality
  - 3a) the outdegree
  - 3b) the indegree

The cells for those indices were coloured grey in case the values for an element were equal or higher than 50 % of the maximal value for an element obtained in that area

Abbreviations for Research Areas: 1 GCa= Gran Canaria, 2 Mad= Madeira, 3 Azo= Azores, 4 Cre= Crete, 5 Sar= Sardinia, 6 Tus= Tuscany, 7 Mal= Mallorca, 8 San= Santander, 9 Bel= Belgium, 10-Dub= Dublin and Liverpool, 11 Gda= Gdansk Bay, 12 Cur= Curonian lagoon, 13 Fin= Finnish archipelago, 14 Por= Porsanger, 15 Sva= Svalbard
Abbreviations for Regions: A. Mac= Macaronesia, B. Med= Mediterranean, C. AtC= Atlantic coast, D. Bal= Baltic, E. Arc= Arctic

| **Research area /** Element | **% of times mention-ed in area** | **Nr trans-mitting connect-ions** | **Outdegree** | **Nr of receiving connect-ions** | **Indegree** | **Total connect ions** | **Centrality** |
|---|---|---|---|---|---|---|---|
| **1 GCa** | | | | | | | |
| Society | 91,7 | 16 | 8,7 | 23 | 12,1 | 39 | 20,8 |
| Economy | 91,7 | 12 | 7,9 | 27 | 12,8 | 39 | 20,7 |
| Large.scale.tourism | 75 | 21 | 10,5 | 8 | 6,4 | 29 | 16,9 |
| Nature | 75 | 6 | 3,2 | 21 | 13,2 | 27 | 16,4 |
| Recreation...Leisure | 66,7 | 15 | 8,4 | 7 | 4,4 | 22 | 12,8 |
| Local.fisheries | 58,3 | 24 | 11,8 | 21 | 17,2 | 45 | 29 |
| Demographics | 58,3 | 14 | 7,7 | 12 | 8 | 26 | 15,7 |
| Conservation | 58,3 | 7 | 6,6 | 16 | 10,7 | 23 | 17,3 |
| Sustainability | 50 | 9 | 4,8 | 12 | 8,7 | 21 | 13,5 |
| Biodiversity | 50 | 2 | 2 | 16 | 11,8 | 18 | 13,8 |
| Pollution | 50 | 7 | 5,8 | 9 | 6 | 16 | 11,8 |
| Local.governance | 50 | 13 | 9,2 | 2 | 0,7 | 15 | 9,9 |
| Local.rules.and.regulations | 50 | 11 | 6,7 | 4 | 3 | 15 | 9,7 |
| Awareness...Knowledge | 50 | 4 | 3,2 | 8 | 3 | 12 | 6,2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2 Mad** | | | | | | | |
| Large.scale.tourism | 100 | 15 | 8,47 | 9 | 6,3 | 24 | 14,8 |
| Economy | 85,7 | 4 | 3 | 10 | 6,87 | 14 | 9,87 |
| Conservation | 71,4 | 12 | 8,4 | 13 | 7,07 | 25 | 15,5 |
| Nature | 71,4 | 3 | 2,6 | 12 | 6,4 | 15 | 9 |
| Local.governance | 71,4 | 6 | 5 | 1 | 0,6 | 7 | 5,6 |
| Disturbance | 57,1 | 7 | 4,8 | 8 | 3,8 | 15 | 8,6 |
| Protected.Areas | 57,1 | 11 | 7,87 | 3 | 3 | 14 | 10,9 |
| Society | 57,1 | 2 | 1,4 | 7 | 6,4 | 9 | 7,8 |
| Charismatic.landscape | 42,9 | 5 | 3,6 | 6 | 5 | 11 | 8,6 |
| **3 Azo** | | | | | | | |
| Economy | 72,2 | 7 | 4,07 | 34 | 16,5 | 41 | 20,6 |
| Nature | 72,2 | 11 | 9,2 | 27 | 16,1 | 38 | 25,3 |
| Local.governance | 55,6 | 23 | 14,8 | 16 | 9,43 | 39 | 24,2 |
| Society | 55,6 | 8 | 6 | 20 | 11,7 | 28 | 17,7 |
| International.governance | 55,6 | 16 | 7,83 | 6 | 3,2 | 22 | 11 |
| Protected.Areas | 50 | 29 | 12,1 | 27 | 17,5 | 56 | 29,6 |
| Large.scale.fisheries | 50 | 16 | 11,3 | 12 | 5,4 | 28 | 16,7 |
| Biodiversity | 50 | 9 | 6,4 | 18 | 10,8 | 27 | 17,2 |
| Conservation | 38,9 | 16 | 8,44 | 14 | 8,7 | 30 | 17,1 |
| SME | 33,3 | 11 | 8,33 | 11 | 7,7 | 22 | 16 |
| Sustainability | 27,8 | 12 | 11,4 | 12 | 9,4 | 24 | 20,8 |
| Industry | 27,8 | 10 | 8 | 11 | 9,2 | 21 | 17,2 |
| Education | 27,8 | 11 | 8,5 | 8 | 6,5 | 19 | 15 |
| **4 Cre** | | | | | | | |
| Large.scale.tourism | 88,9 | 43 | 19 | 45 | 19,6 | 88 | 38,6 |
| Nature | 61,1 | 13 | 8,9 | 31 | 17,9 | 44 | 26,8 |
| Pollution | 61,1 | 12 | 9,8 | 24 | 11,4 | 36 | 21,2 |
| Economy | 55,6 | 17 | 10,1 | 33 | 16,6 | 50 | 26,7 |
| Biodiversity | 55,6 | 13 | 10 | 35 | 18,1 | 48 | 28,1 |
| Urbanisation...Coastal.development | 55,6 | 18 | 7,93 | 15 | 7,8 | 33 | 15,7 |
| Infrastructure...Transport | 50 | 14 | 7,65 | 11 | 7,6 | 25 | 15,3 |
| Awareness...Knowledge | 50 | 13 | 7,4 | 10 | 4,6 | 23 | 12 |
| Overexploitation | 38,9 | 19 | 11,4 | 14 | 9,3 | 33 | 20,7 |
| Education | 27,8 | 23 | 15,9 | 17 | 12,8 | 40 | 28,7 |
| **5 Sar** | | | | | | | |
| Nature | 90 | 22 | 14,6 | 28 | 18,1 | 50 | 32,7 |
| Local.fisheries | 90 | 18 | 8,33 | 18 | 13,4 | 36 | 21,7 |
| Protected.Areas | 80 | 27 | 12,4 | 12 | 6,8 | 39 | 19,2 |
| Large.scale.tourism | 60 | 7 | 2,8 | 24 | 16,5 | 31 | 19,3 |
| Biodiversity | 60 | 10 | 7,6 | 15 | 10,8 | 25 | 18,4 |
| Conservation | 50 | 9 | 8,6 | 17 | 9,73 | 26 | 18,3 |
| Education | 50 | 9 | 7,8 | 11 | 8,9 | 20 | 16,7 |
| Awareness...Knowledge | 50 | 5 | 5 | 14 | 11,6 | 19 | 16,6 |
| Littering | 50 | 5 | 4,2 | 9 | 6,2 | 14 | 10,4 |
| Sustainability | 40 | 29 | 20,4 | 11 | 8,9 | 40 | 29,3 |
| Research | 30 | 16 | 14,6 | 4 | 3,6 | 20 | 18,2 |
| **6 Tus** | | | | | | | |
| Protected.Areas | 71 | 11 | 7,2 | 8 | 3,6 | 19 | 10,8 |
| Communication | 71 | 7 | 3,1 | 5 | 3 | 12 | 6,1 |
| Large.scale.tourism | 57 | 11 | 6,1 | 14 | 7,4 | 25 | 13,5 |
| Pollution | 57 | 9 | 6,4 | 7 | 4,1 | 16 | 10,5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SME | 57 | 3 | 1,5 | 8 | 5 | 11 | 6,5 |
| Recreation...Leisure | 43 | 4 | 2 | 8 | 6 | 12 | 8 |
| Habitats | 29 | 5 | 4,2 | 11 | 5,5 | 16 | 9,7 |
| **7 Mal** | | | | | | | |
| Local.fisheries | 76,9 | 17 | 4,8 | 23 | 9,3 | 40 | 14,1 |
| Large.scale.tourism | 69,2 | 29 | 10,7 | 14 | 8,6 | 43 | 19,3 |
| Biodiversity | 61,5 | 6 | 4,1 | 37 | 15,5 | 43 | 19,6 |
| Conservation | 61,5 | 8 | 6,8 | 25 | 13,8 | 33 | 20,6 |
| Protected.Areas | 53,8 | 9 | 5,27 | 23 | 10,7 | 32 | 16 |
| Local.rules.and.regulations | 53,8 | 23 | 10,2 | 5 | 4,6 | 28 | 14,8 |
| Recreation...Leisure | 53,8 | 8 | 4,9 | 12 | 7,6 | 20 | 12,5 |
| Awareness...Knowledge | 53,8 | 9 | 7,6 | 10 | 5,3 | 19 | 12,9 |
| Infrastructure...Transport | 53,8 | 15 | 6,17 | 3 | 1,7 | 18 | 7,87 |
| SME | 46,2 | 12 | 8,4 | 13 | 9,5 | 25 | 17,9 |
| Habitats | 46,2 | 4 | 3 | 19 | 12,7 | 23 | 15,7 |
| Implementation...Control.of.Rules | 46,2 | 13 | 9,4 | 7 | 4,6 | 20 | 14 |
| Communication | 46,2 | 10 | 8,2 | 4 | 2,8 | 14 | 11 |
| Small.scale.tourism | 38,5 | 17 | 6,9 | 15 | 10,2 | 32 | 17,1 |
| Local.governance | 38,5 | 13 | 8,3 | 3 | 2,2 | 16 | 10,5 |
| Nature | 30,8 | 8 | 4,2 | 26 | 14,6 | 34 | 18,8 |
| National.governance.and.policy | 30,8 | 12 | 9,2 | 3 | 2 | 15 | 11,2 |
| NGOs.and.Museums | 15,4 | 16 | 11,2 | 1 | 1 | 17 | 12,2 |
| **8 San** | | | | | | | |
| Awareness...Knowledge | 60 | 27 | 17,9 | 18 | 11,7 | 45 | 29,6 |
| Nature | 60 | 10 | 7,4 | 25 | 13,7 | 35 | 21,1 |
| Pollution | 60 | 17 | 13,3 | 12 | 8,3 | 29 | 21,6 |
| Large.scale.tourism | 60 | 8 | 5,7 | 15 | 9,9 | 23 | 15,6 |
| Economy | 60 | 3 | 2,2 | 19 | 11,6 | 22 | 13,8 |
| Society | 50 | 8 | 3,2 | 13 | 10,3 | 21 | 13,5 |
| Sustainability | 50 | 7 | 5,3 | 10 | 9,6 | 17 | 14,9 |
| Spatial.planning | 50 | 13 | 9,53 | 4 | 3,8 | 17 | 13,3 |
| Industry | 50 | 11 | 5,9 | 4 | 3,8 | 15 | 9,7 |
| Local.governance | 40 | 23 | 17,3 | 10 | 8,4 | 33 | 25,7 |
| Conservation | 40 | 8 | 5,8 | 16 | 9,53 | 24 | 15,3 |
| Conflict.of.interests | 20 | 11 | 9,4 | 7 | 6,2 | 18 | 15,6 |
| Harbour | 20 | 11 | 9,2 | 7 | 6,2 | 18 | 15,4 |
| National.governance.and.policy | 20 | 10 | 9,8 | 6 | 5,4 | 16 | 15,2 |
| **9 Bel** | | | | | | | |
| Nature | 78,6 | 15 | 9,8 | 19 | 11,3 | 34 | 21,1 |
| Spatial.planning | 64,3 | 17 | 8 | 18 | 11,2 | 35 | 19,2 |
| Large.scale.fisheries | 64,3 | 13 | 6,33 | 10 | 5,4 | 23 | 11,7 |
| Renewables | 57,1 | 19 | 11,7 | 13 | 10,4 | 32 | 22,1 |
| Large.scale.tourism | 57,1 | 14 | 7,4 | 15 | 10 | 29 | 17,4 |
| Economy | 42,9 | 10 | 5 | 13 | 8,3 | 23 | 13,3 |
| Biodiversity | 42,9 | 6 | 4,4 | 17 | 7,43 | 23 | 11,8 |
| Coastal.protection | 42,9 | 7 | 4,31 | 15 | 8,8 | 22 | 13,1 |
| Local.governance | 42,9 | 12 | 7 | 9 | 5 | 21 | 12 |
| Habitats | 35,7 | 12 | 9,9 | 18 | 12,7 | 30 | 22,6 |
| Recreation...Leisure | 35,7 | 10 | 4,1 | 16 | 9,3 | 26 | 13,4 |
| Research | 35,7 | 15 | 7,2 | 10 | 6,6 | 25 | 13,8 |
| Awareness...Knowledge | 28,6 | 16 | 13,5 | 13 | 12 | 29 | 25,5 |
| **10 Dub** | | | | | | | |
| Nature | 83,3 | 11 | 4,5 | 26 | 11,3 | 37 | 15,8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Biodiversity | 83,3 | 6 | 3,2 | 29 | 14 | 35 | 17,2 |
| Recreation...Leisure | 66,7 | 30 | 13 | 15 | 8,9 | 45 | 21,9 |
| Renewables | 66,7 | 18 | 9 | 26 | 17,8 | 44 | 26,8 |
| Pollution | 66,7 | 12 | 4,5 | 13 | 7,5 | 25 | 12 |
| Geophysical..water..air..sediment..characteristics | 58,3 | 25 | 9,1 | 22 | 10,8 | 47 | 19,9 |
| Awareness...Knowledge | 58,3 | 16 | 9,7 | 13 | 5,05 | 29 | 14,8 |
| Habitats | 58,3 | 8 | 4,3 | 16 | 6,8 | 24 | 11,1 |
| Large.scale.fisheries | 58,3 | 11 | 6,8 | 11 | 6,2 | 22 | 13 |
| National.governance.and.policy | 50 | 17 | 10,8 | 12 | 8,6 | 29 | 19,4 |
| Climate.change | 50 | 18 | 6,5 | 11 | 7,1 | 29 | 13,6 |
| Economy | 50 | 6 | 3,2 | 22 | 11,4 | 28 | 14,6 |
| Infrastructure...Transport | 50 | 10 | 6 | 6 | 4,8 | 16 | 10,8 |
| Research | 41,7 | 20 | 13,5 | 8 | 3,3 | 28 | 16,8 |
| Society | 41,7 | 14 | 7 | 12 | 6,1 | 26 | 13,1 |
| Protected.Areas | 33,3 | 15 | 8,2 | 15 | 11,7 | 30 | 19,9 |
| Urbanisation...Coastal.development | 33,3 | 16 | 7,6 | 10 | 7,4 | 26 | 15 |
| NGOs.and.Museums | 25 | 26 | 17,5 | 7 | 4,8 | 33 | 22,3 |
| **11 Gda** | | | | | | | |
| Large.scale.tourism | 92,3 | 33 | 11,5 | 24 | 10,7 | 57 | 22,2 |
| Economy | 76,9 | 12 | 6,6 | 24 | 12,9 | 36 | 19,5 |
| Nature | 69,2 | 8 | 5,4 | 33 | 21,1 | 41 | 26,5 |
| Disturbance | 61,5 | 9 | 6,8 | 7 | 5,1 | 16 | 11,9 |
| Awareness...Knowledge | 53,8 | 20 | 11,6 | 9 | 6 | 29 | 17,6 |
| Pollution | 53,8 | 10 | 4,6 | 13 | 7,9 | 23 | 12,5 |
| **12 Cur** | | | | | | | |
| Large.scale.tourism | 68,8 | 18 | 10,3 | 53 | 21,7 | 71 | 32 |
| Large.scale.fisheries | 68,8 | 21 | 10,3 | 40 | 13,5 | 61 | 23,8 |
| Recreation...Leisure | 50 | 18 | 5,93 | 25 | 11,3 | 43 | 17,2 |
| Protected.Areas | 50 | 17 | 8,6 | 12 | 6,9 | 29 | 15,5 |
| Local.rules.and.regulations | 50 | 17 | 10,4 | 9 | 4,5 | 26 | 14,9 |
| Climate.change | 50 | 17 | 7,9 | 5 | 3 | 22 | 10,9 |
| Pollution | 50 | 11 | 5,25 | 10 | 5,27 | 21 | 10,5 |
| Harbour | 43,8 | 17 | 13,8 | 5 | 2,8 | 22 | 16,6 |
| Biodiversity | 31,3 | 10 | 5,47 | 17 | 11,1 | 27 | 16,6 |
| **13 Fin** | | | | | | | |
| Economy | 71,4 | 6 | 3,7 | 33 | 13,7 | 39 | 17,4 |
| Small.scale.tourism | 64,3 | 20 | 6,23 | 18 | 9,27 | 38 | 15,5 |
| Pollution | 64,3 | 10 | 5,33 | 20 | 7,32 | 30 | 12,7 |
| Nature | 64,3 | 8 | 7 | 20 | 10,8 | 28 | 17,8 |
| Biodiversity | 57,1 | 6 | 4,4 | 13 | 9,4 | 19 | 13,8 |
| Awareness...Knowledge | 50 | 14 | 8,8 | 17 | 9,4 | 31 | 18,2 |
| Society | 50 | 10 | 5,13 | 13 | 8,7 | 23 | 13,8 |
| Recreation...Leisure | 42,9 | 11 | 6,07 | 9 | 6,2 | 20 | 12,3 |
| Agriculture | 42,9 | 15 | 6,97 | 5 | 3,8 | 20 | 10,8 |
| Conservation | 42,9 | 8 | 5,7 | 11 | 6,8 | 19 | 12,5 |
| Collaboration | 42,9 | 13 | 8,8 | 5 | 3,8 | 18 | 12,6 |
| Charismatic.landscape | 35,7 | 7 | 5 | 9 | 5,2 | 16 | 10,2 |
| Education | 28,6 | 16 | 9,7 | 1 | 1 | 17 | 10,7 |
| Sense.of.community...Identity | 28,6 | 4 | 2,4 | 11 | 7,6 | 15 | 10 |
| **14 Por** | | | | | | | |
| Economy | 91,7 | 11 | 4,85 | 31 | 15,3 | 42 | 20,2 |
| Biodiversity | 75 | 14 | 7,8 | 24 | 16,7 | 38 | 24,5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nature | 66,7 | 12 | 6,8 | 21 | 14,6 | 33 | 21,4 |
| Exotic.species | 66,7 | 24 | 10,3 | 8 | 2,7 | 32 | 13 |
| Large.scale.fisheries | 66,7 | 10 | 6,4 | 8 | 5 | 18 | 11,4 |
| Society | 58,3 | 8 | 6,3 | 24 | 15,5 | 32 | 21,8 |
| Marine.resources | 50 | 10 | 7,4 | 11 | 4,2 | 21 | 11,6 |
| Cultural.heritage...Traditions | 50 | 6 | 2,8 | 12 | 7,17 | 18 | 9,97 |
| Pollution | 50 | 10 | 8,2 | 4 | 3,6 | 14 | 11,8 |
| Iconic.species | 41,7 | 9 | 6 | 19 | 10,5 | 28 | 16,5 |
| Aquaculture | 33,3 | 16 | 7,9 | 8 | 4,4 | 24 | 12,3 |
| Small.scale.tourism | 33,3 | 5 | 3,4 | 15 | 11,7 | 20 | 15,1 |
| Multicultural...Indigenous.society | 33,3 | 6 | 5,2 | 12 | 8,4 | 18 | 13,6 |
| Restoration...compensation | 33,3 | 11 | 7,8 | 5 | 4,6 | 16 | 12,4 |
| Local.fisheries | 25 | 12 | 7,77 | 10 | 3,8 | 22 | 11,6 |
| | | | | | | | |
| **15 Sva** | | | | | | | |
| Large.scale.tourism | 94,1 | 47 | 17,1 | 40 | 15,4 | 87 | 32,5 |
| Economy | 88,2 | 24 | 10,7 | 36 | 12,2 | 60 | 22,9 |
| Society | 82,4 | 8 | 5 | 50 | 14,4 | 58 | 19,4 |
| Nature | 76,5 | 19 | 8,83 | 24 | 12,9 | 43 | 21,8 |
| Climate.change | 64,7 | 32 | 13,6 | 5 | 3,8 | 37 | 17,4 |
| SME | 64,7 | 11 | 4,1 | 26 | 7,92 | 37 | 12 |
| Local.rules.and.regulations | 58,8 | 25 | 7,23 | 17 | 7,15 | 42 | 14,4 |
| Biodiversity | 58,8 | 14 | 7,17 | 19 | 9,2 | 33 | 16,4 |
| Industry | 58,8 | 22 | 9,27 | 6 | 3 | 28 | 12,3 |
| Awareness...Knowledge | 58,8 | 6 | 2 | 18 | 8,9 | 24 | 10,9 |
| Local.governance | 52,9 | 24 | 10,1 | 10 | 5,4 | 34 | 15,5 |
| Research | 52,9 | 15 | 10,1 | 13 | 8 | 28 | 18,1 |
| Seasonality | 52,9 | 12 | 3,5 | 7 | 2,8 | 19 | 6,3 |
| | | | | | | | |
| | | | | | | | |
| **A Mac** | | | | | | | |
| Economy | 81 | 23 | 12 | 71 | 24 | 94 | 36 |
| Nature | 73 | 20 | 13 | 60 | 27 | 80 | 40 |
| Society | 68 | 26 | 13 | 50 | 23 | 76 | 35 |
| Large.scale.tourism | 62 | 48 | 15 | 27 | 17 | 75 | 32 |
| Local.governance | 57 | 42 | 20 | 19 | 10 | 61 | 30 |
| Conservation | 51 | 35 | 17 | 43 | 20 | 78 | 37 |
| Protected.Areas | 49 | 47 | 17 | 35 | 19 | 82 | 37 |
| Biodiversity | 43 | 12 | 7,5 | 39 | 20 | 51 | 27 |
| Recreation...Leisure | 43 | 25 | 10 | 18 | 11 | 43 | 22 |
| Awareness...Knowledge | 41 | 21 | 12 | 20 | 11 | 41 | 23 |
| Pollution | 38 | 22 | 11 | 17 | 9,5 | 39 | 21 |
| Sustainability | 32 | 25 | 15 | 24 | 16 | 49 | 31 |
| Local.fisheries | 30 | 29 | 14 | 25 | 18 | 54 | 32 |
| SME | 27 | 20 | 11 | 13 | 8,8 | 33 | 20 |
| | | | | | | | |
| **B Med** | | | | | | | |
| Large.scale.tourism | 73 | 90 | 24 | 97 | 36 | 187 | 60 |
| Local.fisheries | 58 | 44 | 15 | 65 | 23 | 109 | 37 |
| Biodiversity | 56 | 29 | 15 | 95 | 28 | 124 | 43 |
| Nature | 52 | 43 | 20 | 89 | 34 | 132 | 54 |
| Pollution | 50 | 36 | 16 | 44 | 18 | 80 | 34 |
| Protected.Areas | 44 | 51 | 16 | 46 | 18 | 97 | 34 |
| SME | 44 | 36 | 19 | 48 | 22 | 84 | 41 |
| Conservation | 44 | 22 | 15 | 58 | 20 | 80 | 34 |
| Awareness...Knowledge | 44 | 27 | 17 | 34 | 18 | 61 | 35 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Economy | 40 | 27 | 16 | 52 | 21 | 79 | 37 |
| Recreation...Leisure | 35 | 28 | 15 | 35 | 18 | 63 | 32 |
| Research | 31 | 51 | 25 | 19 | 15 | 70 | 39 |
| Habitats | 27 | 13 | 8,5 | 41 | 22 | 54 | 30 |
| Education | 25 | 35 | 22 | 30 | 18 | 65 | 40 |
| Sustainability | 21 | 38 | 23 | 33 | 18 | 71 | 41 |
| **C AtC** | | | | | | | |
| Nature | 75 | 36 | 16 | 70 | 25 | 106 | 41 |
| Renewables | 50 | 41 | 19 | 43 | 22 | 84 | 41 |
| Economy | 50 | 19 | 8,4 | 54 | 23 | 73 | 31 |
| Biodiversity | 50 | 17 | 9,4 | 54 | 21 | 71 | 31 |
| Large.scale.fisheries | 50 | 27 | 13 | 25 | 12 | 52 | 25 |
| Awareness...Knowledge | 47 | 59 | 26 | 44 | 20 | 103 | 46 |
| Spatial.planning | 47 | 41 | 18 | 31 | 15 | 72 | 33 |
| Large.scale.tourism | 47 | 28 | 15 | 40 | 22 | 68 | 36 |
| Pollution | 44 | 31 | 17 | 29 | 14 | 60 | 31 |
| Recreation...Leisure | 39 | 41 | 14 | 32 | 17 | 73 | 32 |
| Research | 39 | 47 | 23 | 20 | 10 | 67 | 33 |
| Habitats | 36 | 22 | 12 | 41 | 18 | 63 | 30 |
| Society | 36 | 23 | 8,7 | 30 | 15 | 53 | 24 |
| Local.governance | 33 | 41 | 25 | 25 | 14 | 66 | 39 |
| Harbour | 31 | 33 | 17 | 16 | 9 | 49 | 26 |
| Urbanisation...Coastal.development | 28 | 28 | 13 | 22 | 12 | 50 | 25 |
| Sustainability | 28 | 15 | 11 | 19 | 13 | 34 | 25 |
| National.governance.and.policy | 25 | 31 | 19 | 18 | 12 | 49 | 31 |
| Protected.Areas | 19 | 20 | 10 | 22 | 15 | 42 | 26 |
| NGOs.and.Museums | 11 | 37 | 22 | 7 | 4,8 | 44 | 27 |
| **D Bal** | | | | | | | |
| Large.scale.tourism | 58 | 55 | 18 | 78 | 28 | 133 | 46 |
| Economy | 58 | 29 | 9,7 | 69 | 26 | 98 | 36 |
| Pollution | 56 | 31 | 10 | 43 | 15 | 74 | 26 |
| Nature | 51 | 20 | 14 | 60 | 28 | 80 | 43 |
| Recreation...Leisure | 44 | 35 | 12 | 45 | 17 | 80 | 29 |
| Biodiversity | 44 | 22 | 10 | 49 | 21 | 71 | 31 |
| Large.scale.fisheries | 37 | 27 | 10 | 52 | 17 | 79 | 27 |
| Awareness...Knowledge | 37 | 39 | 20 | 28 | 12 | 67 | 31 |
| Society | 35 | 23 | 11 | 29 | 12 | 52 | 23 |
| Harbour | 26 | 30 | 18 | 13 | 7,7 | 43 | 26 |
| Collaboration | 21 | 23 | 16 | 10 | 7 | 33 | 23 |
| **E Arc** | | | | | | | |
| Economy | 90 | 35 | 14 | 67 | 24 | 102 | 38 |
| Society | 72 | 16 | 10 | 74 | 25 | 90 | 35 |
| Nature | 72 | 31 | 16 | 45 | 22 | 76 | 38 |
| Biodiversity | 66 | 28 | 13 | 43 | 19 | 71 | 32 |
| Large.scale.tourism | 55 | 47 | 17 | 40 | 15 | 87 | 32 |
| Climate.change | 52 | 41 | 14 | 7 | 3,7 | 48 | 18 |
| SME | 52 | 14 | 5,1 | 32 | 10 | 46 | 15 |
| Local.rules.and.regulations | 45 | 33 | 11 | 19 | 9 | 52 | 20 |
| Research | 38 | 19 | 14 | 13 | 8 | 32 | 22 |
| Small.scale.tourism | 24 | 17 | 9,1 | 19 | 13 | 36 | 22 |
| Multicultural...Indigenous.society | 24 | 13 | 8 | 20 | 12 | 33 | 20 |

# Appendix 9. Scores on the level of importance for interview elements

The level of importance for elements obtained during interviews with stakeholders are presented. The general procedure is explained in chapter 2.3. A short overview of the selection procedure is given below.

To be indicated as important an element had :
- A) to have in at least one case research area:
  - a frequency >= 50 %, and/or,
  - a number of connections that is at least 50 % of the highest number of connections an element did have in that area, and/or,
  - a centrality that is at least 50 % of the highest centrality an element did have in that area, or,
- B) to belong among the pairs (combinations) of elements:
  - to the combinations mentioned in at least 10 interviews, or,
  - to the top 30 of sending elements, or,
  - to the top 30 of receiving elements.

The elements selected according the criteria mentioned under A are emphasised in green color, those according criterium B in yellow colour.
The elements are ordered following the total sum of incoming and outgoing vectors.

| Element | Top 30 Sending | Top 30 Receiving | Total nr. connections |
|---|---|---|---|
| Large.scale.tourism | 1 | 3 | 550 |
| Nature | 6 | 1 | 474 |
| Economy | 10 | 2 | 446 |
| Biodiversity | 12 | 4 | 388 |
| Society | 16 | 5 | 308 |
| Awareness...Knowledge | 3 | 7 | 300 |
| Protected.Areas | 4 | 12 | 286 |
| Pollution | 9 | 8 | 285 |
| Recreation...Leisure | 7 | 10 | 283 |
| Local.governance | 2 | 21 | 268 |
| Conservation | 17 | 6 | 262 |
| Local.fisheries | 14 | 11 | 243 |
| SME | 26 | 13 | 216 |
| Large.scale.fisheries | 19 | 14 | 214 |
| Research | 5 | 27 | 213 |
| Habitats | 34 | 9 | 205 |
| Sustainability | 20 | 15 | 203 |
| Climate.change | 8 | 33 | 194 |
| Local.rules.and.regulations | 11 | 28 | 176 |
| Small.scale.tourism | 28 | 19 | 163 |
| Education | 22 | 25 | 157 |
| National.governance.and.policy | 13 | 35 | 153 |
| Urbanisation...Coastal.development | 27 | 23 | 150 |

| | | | |
|---|---|---|---|
| Infrastructure...Transport | 21 | 31 | 149 |
| Geophysical..water..air..sediment..characteristics | 31 | 20 | 148 |
| Spatial.planning | 24 | 30 | 145 |
| Cultural.heritage...Traditions | 36 | 18 | 144 |
| Industry | 18 | 38 | 142 |
| National.rules.and.regulations | 15 | 46 | 142 |
| Marine.resources | 41 | 16 | 138 |
| Renewables | 32 | 26 | 131 |
| Communication | 30 | 32 | 131 |
| Harbour | 25 | 39 | 129 |
| Disturbance | 35 | 24 | 127 |
| Income...Employment | 50 | 17 | 122 |
| International.governance | 23 | 52 | 121 |
| Charismatic.landscape | 46 | 22 | 112 |
| NGOs.and.Museums | 29 | 48 | 112 |
| Exotic.species | 33 | 41 | 104 |
| Overexploitation | 38 | 36 | 101 |
| Implementation...Control.of.Rules | 40 | 37 | 96 |
| Collaboration | 37 | 58 | 85 |
| Littering | 53 | 34 | 80 |
| Demographics | 47 | 44 | 79 |
| Conflict.of.interests | 48 | 43 | 76 |
| Seasonality | 42 | 57 | 75 |
| Health...Quality.of.life | 73 | 29 | 72 |
| Agriculture | 44 | 61 | 68 |
| Aquaculture | 43 | 68 | 64 |
| Coastal.protection | 56 | 50 | 58 |
| Sense.of.community...Identity | 72 | 51 | 50 |
| Restoration...compensation | 60 | 73 | 40 |
| Iconic.species | 80 | 55 | 38 |
| Multicultural...Indigenous.society | 77 | 67 | 33 |
| | | | |
| **Elements not fulfilling the criteria on importance** | | | |
| Public.participation | 45 | 40 | 86 |
| Technology...Innovation | 39 | 64 | 75 |
| Trade...Transport | 51 | 49 | 67 |
| Ecological.dynamics | 59 | 45 | 62 |
| Respect | 64 | 42 | 62 |
| Public.opinion | 58 | 47 | 60 |
| Sanitation | 54 | 54 | 60 |
| Funding | 49 | 66 | 56 |
| MPA.management | 55 | 60 | 54 |
| Diversification | 57 | 59 | 52 |
| Political.trust...Good.governance | 65 | 56 | 49 |
| Nature.experience | 71 | 53 | 49 |
| Law.enforcement.bodies | 52 | 75 | 47 |
| Erosion | 66 | 63 | 44 |

| | | | |
|---|---|---|---|
| Biological.plagues...hazards | 61 | 65 | 43 |
| Decision.support...Management.tools | 62 | 71 | 40 |
| Risk.and.Safety.Management | 68 | 70 | 39 |
| Maintenance | 63 | 74 | 37 |
| Accessibility | 76 | 62 | 37 |
| Natural.hazards | 70 | 69 | 37 |
| Illegal.activities | 69 | 72 | 35 |
| Geopolitics | 67 | 84 | 28 |
| Bureaucracy..Mismanagement...Bad.Governance | 74 | 81 | 23 |
| Local.market | 82 | 77 | 21 |
| Weather | 75 | 86 | 21 |
| Business.relations | 84 | 76 | 20 |
| Staff...Equipment | 78 | 85 | 20 |
| Intrinsic.value.of.nature | 81 | 79 | 19 |
| Strategic.plans | 83 | 80 | 19 |
| Resilience | 89 | 78 | 15 |
| Competitor.in.food.chain | 85 | 87 | 13 |
| Isolation | 79 | | 12 |
| Fairness | 88 | 82 | 12 |
| Extraction | 86 | 88 | 11 |
| Regulatory...Provisioning.ES | 92 | 83 | 11 |
| Environmental.rewilding | 87 | 90 | 8 |
| Decadence | 91 | 89 | 7 |
| Strategic.position | 90 | 91 | 6 |

# Appendix 10. Geographic gradients for important interview elements

The most important elements obtained during interviews with stakeholders are presented. The general selection procedure is explained in chapter 2.3, and in Appendix 8.

In the graphs below, along a geographic gradient from South to North Europe, the following three indices for the important elements are illustrated:
1) on the left (blue bar): The frequency an element was mentioned by stakeholders (max 100 %)(),
2) in the middle (orange bar): The total number of (incoming and outgoing) connections it had with other elements in the network of the research area or region),
3) on the right (grey bar): The centrality of the connections to the element (i.e. the sum of the average absolute values/power for each connection, ranging from 1 to 5, with another element in the network of the research area or region)

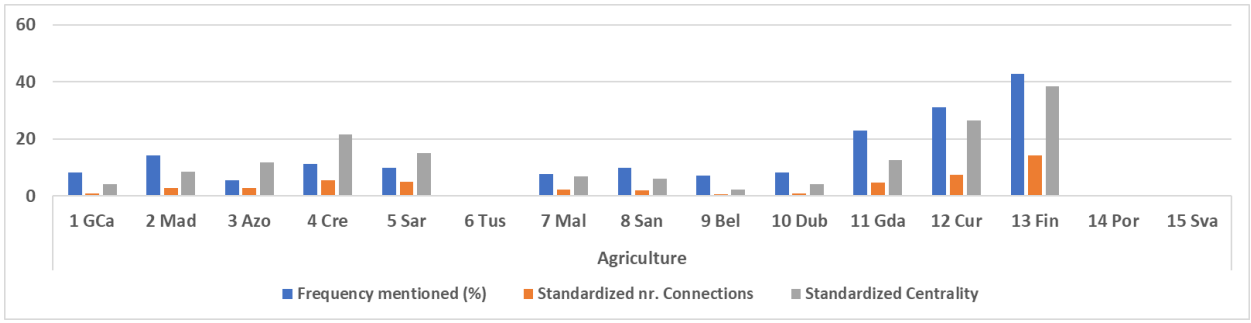
To compensate for different numbers of interviewed stakeholders, the results were standardised on basis of 10 interviews per area.

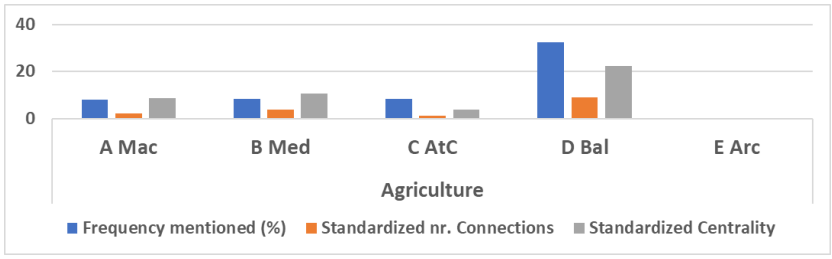
For each element firstly the result per research area is presented. Secondly the average result per region is presented.

Research areas are numbered from south to north: 1 GCa= Gran Canaria, 2 Mad= Madeira, 3 Azo= Azores, 4 Cre= Crete, 5 Sar= Sardinia, 6 Tus= Tuscany, 7 Mal= Mallorca, 8 San= Santander, 9 Bel= Belgium, 10-Dub= Dublin and Liverpool, 11 Gda= Gdansk Bay, 12 Cur= Curonian lagoon, 13 Fin= Finnish archipelago. 14 Por= Porsanger, 15 Sva= Svalbard).
Regions are numbered with capital letters: A Mac= Macaronesia, B Med= Mediiterranean, C AtC= Atlantic coast, D Bal= Baltic, E Arc= Arctic.

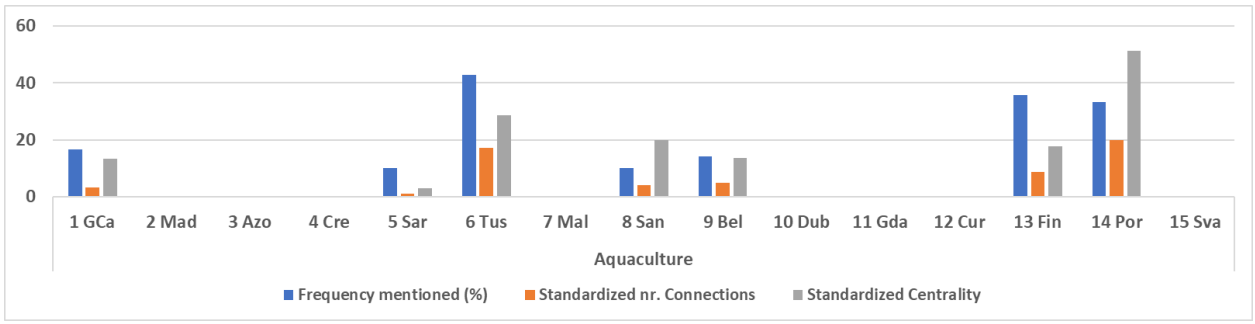
The elements are presented in alphabetic order.

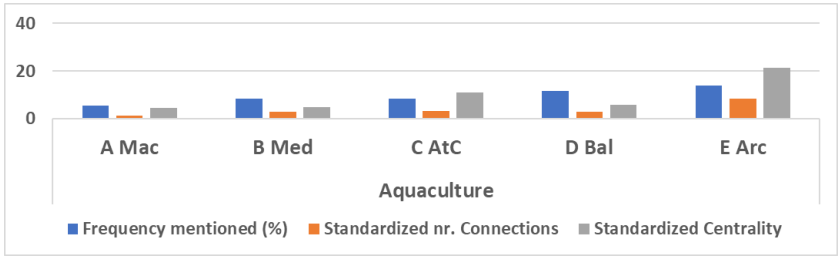
Agriculture



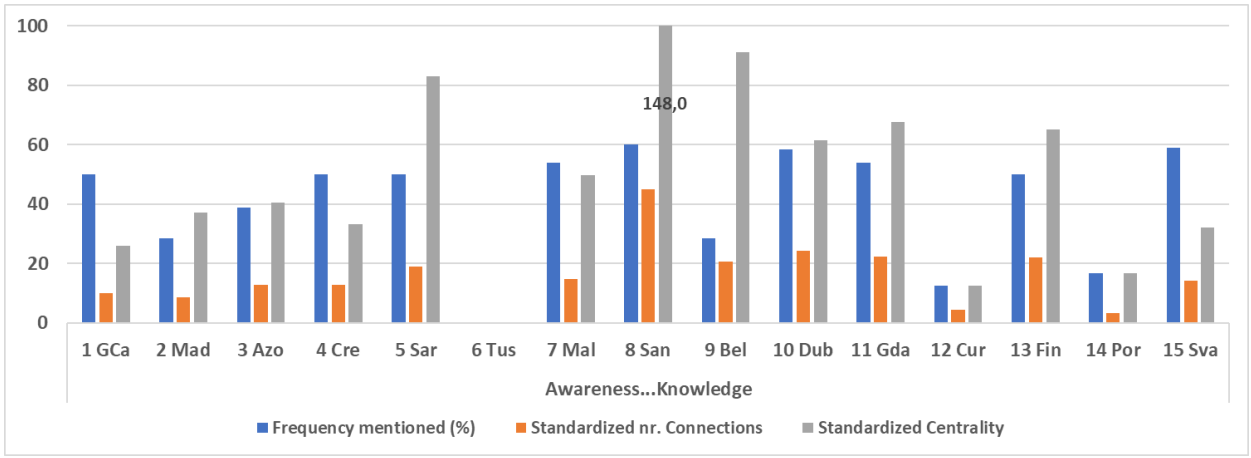



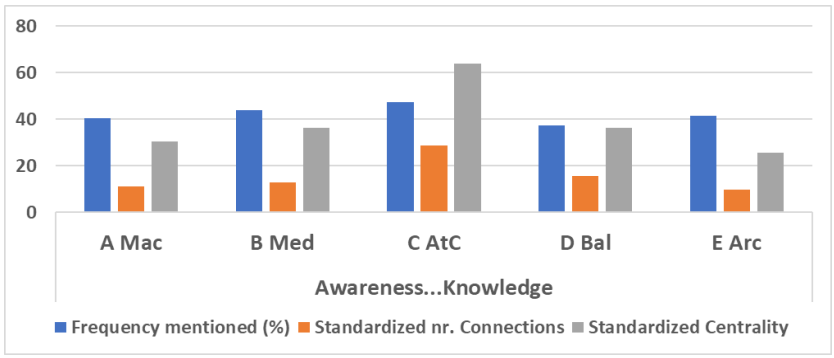

Aquaculture



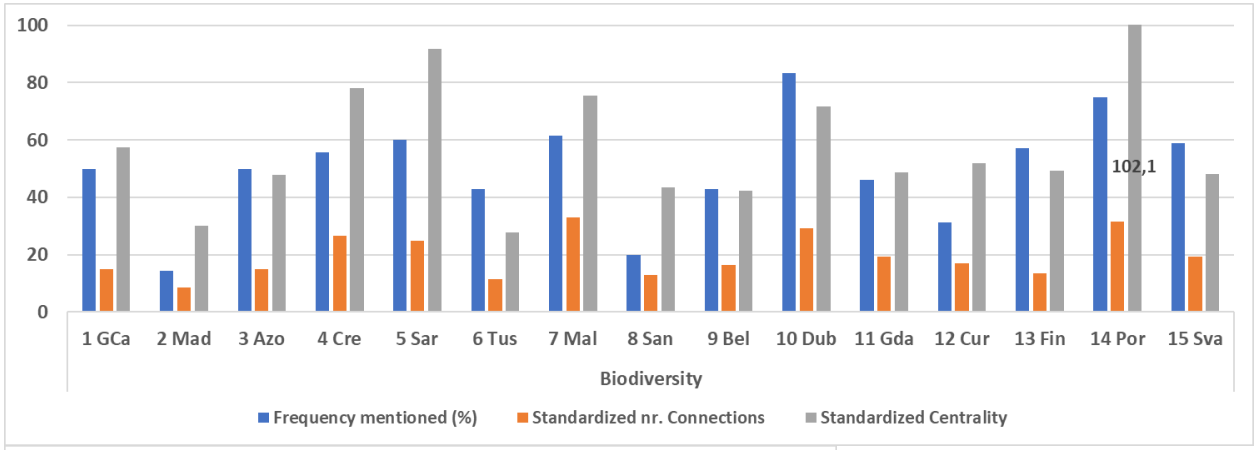



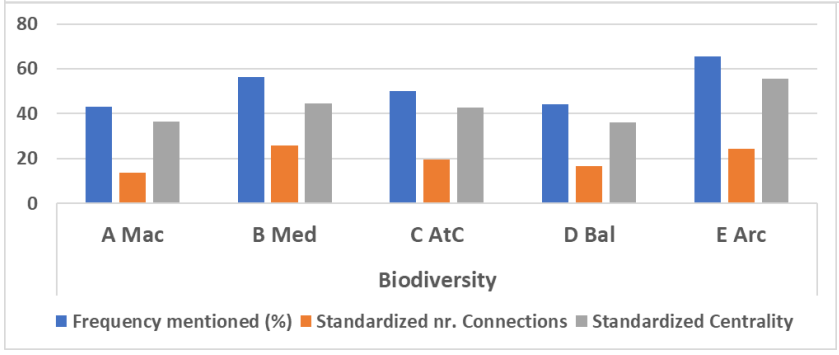
Awareness and Knowledge



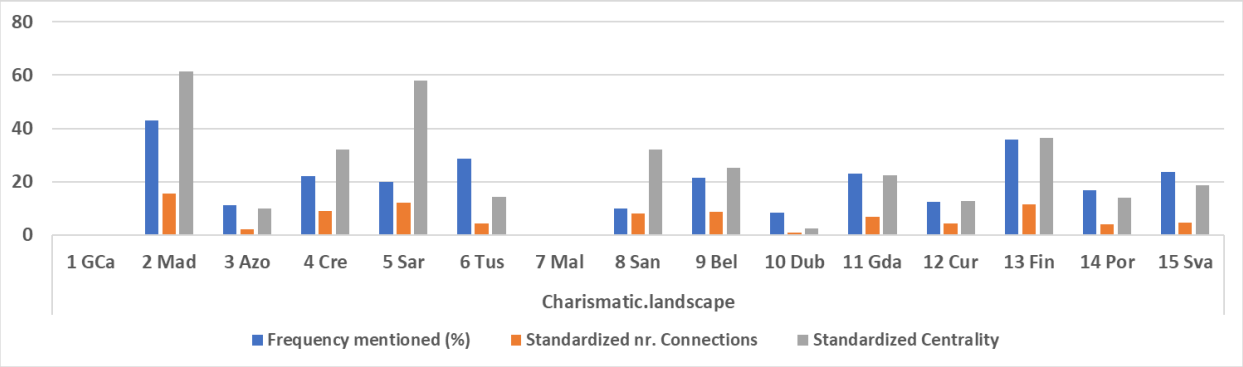



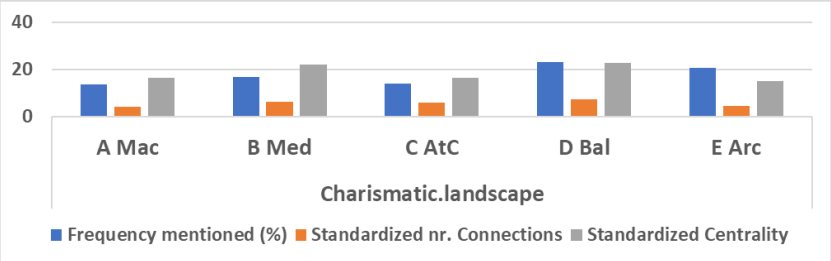

Biodiversity



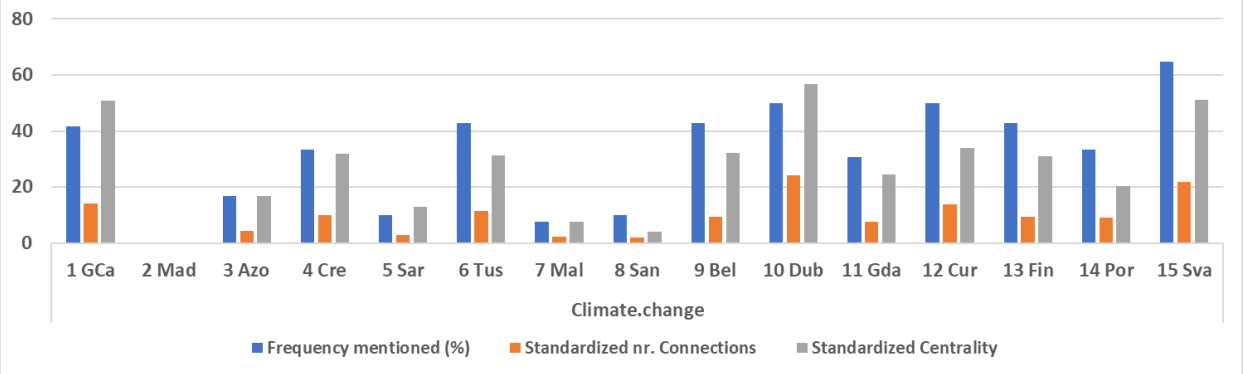



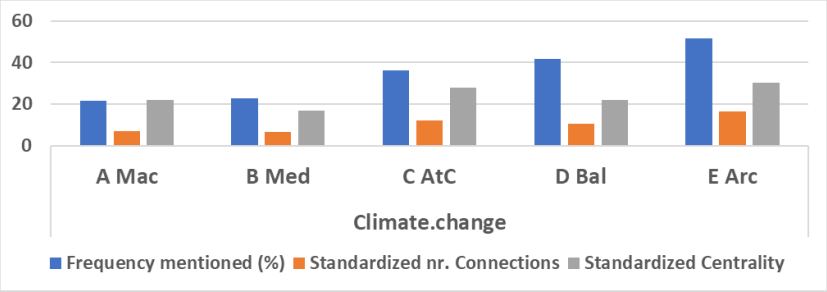
Charismatic Landscape



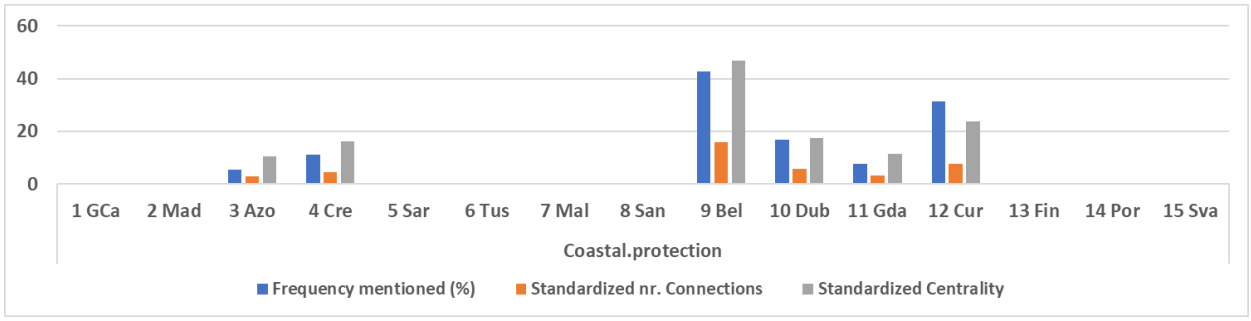



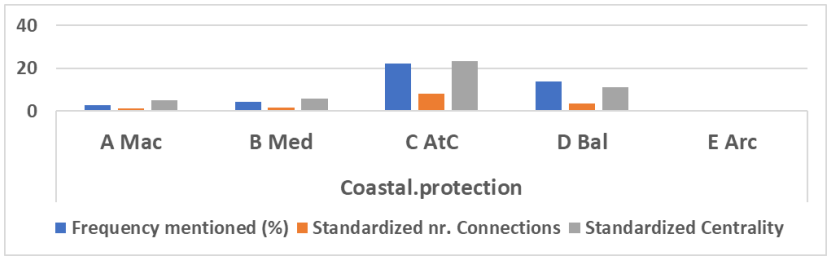

Climate Change



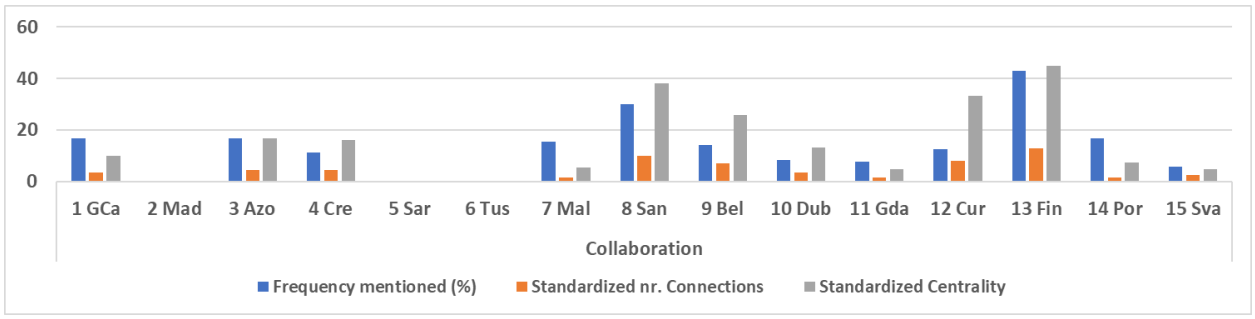



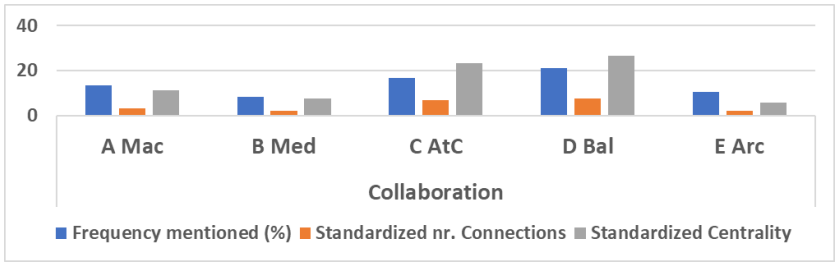
Coastal Protection



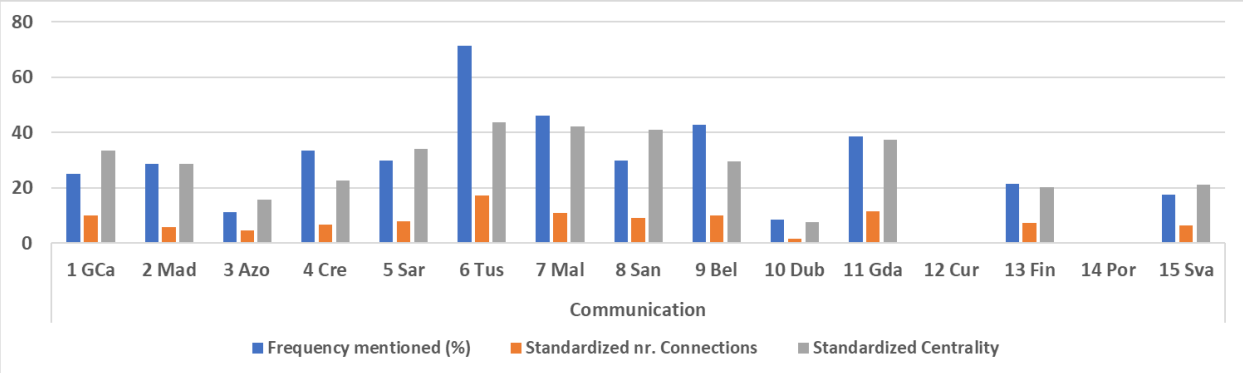



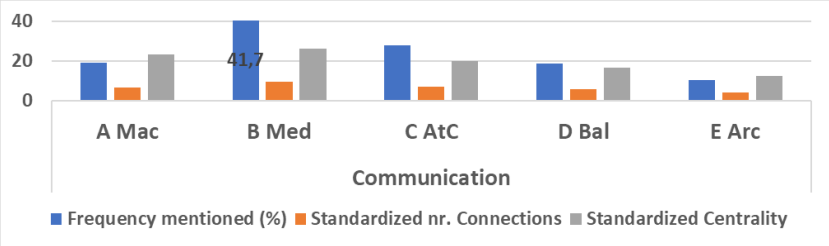

Collaboration



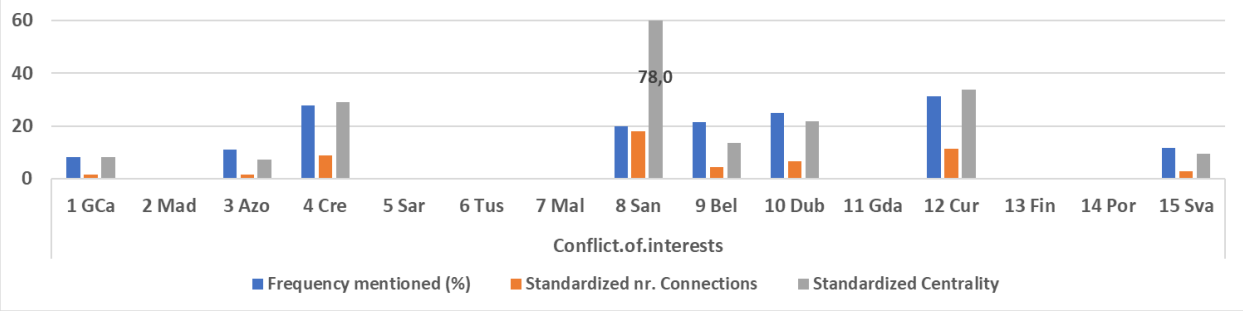



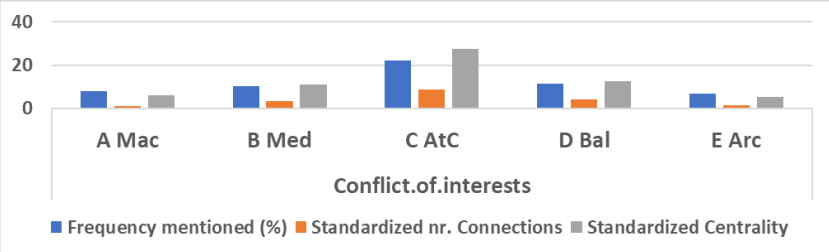
Communication



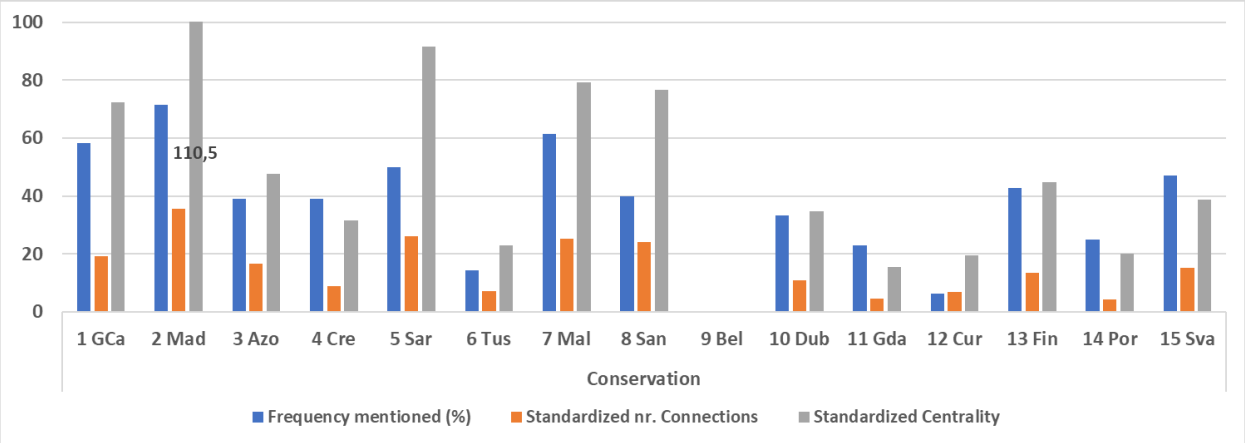



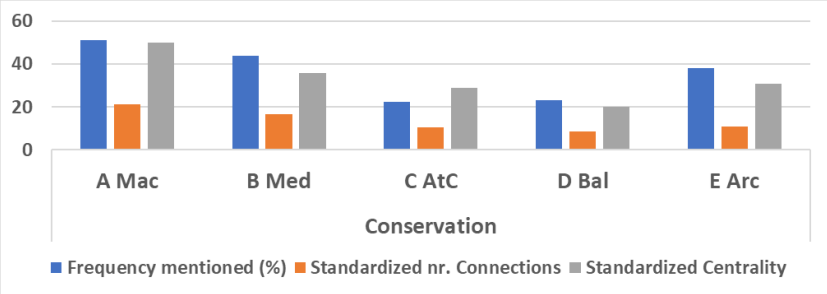

Conflict of Interest



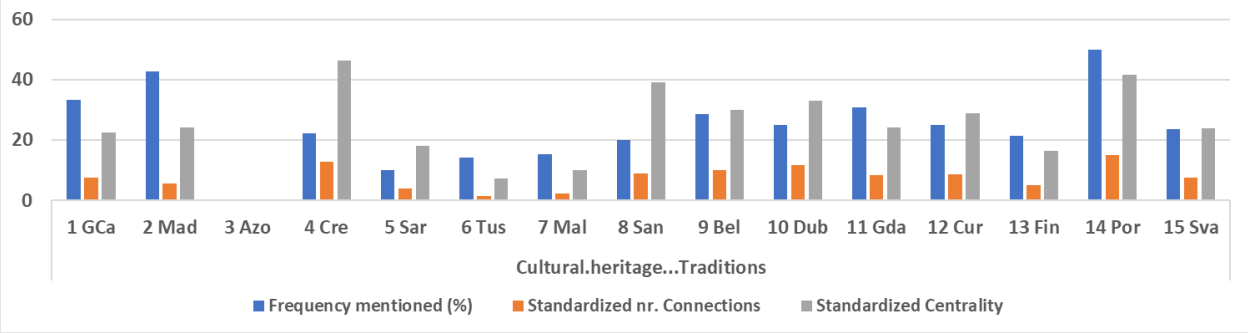



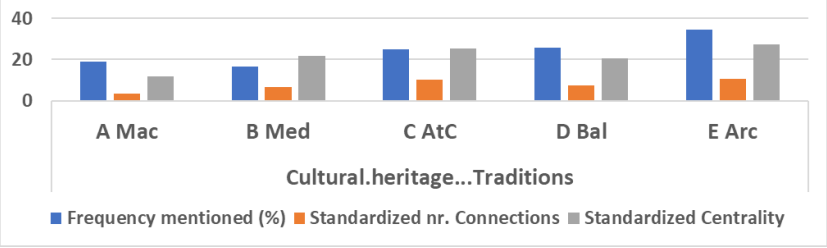
Conservation



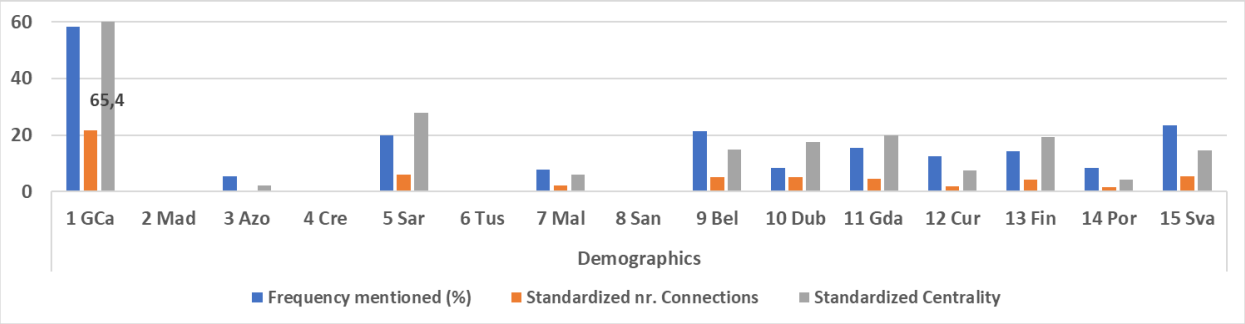



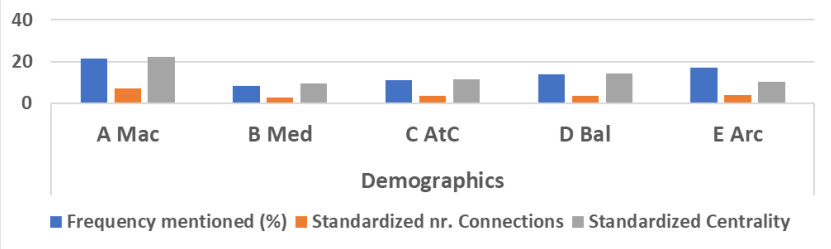

Cultural Heritage and Traditions



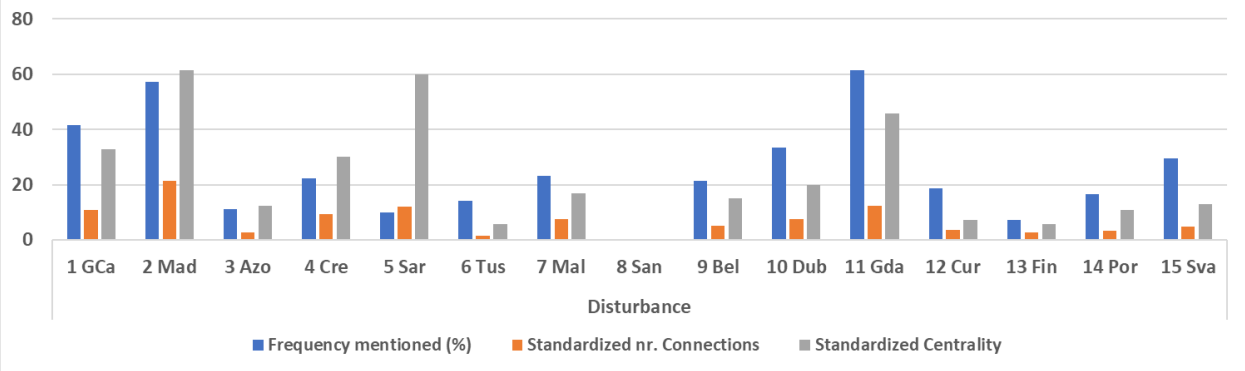



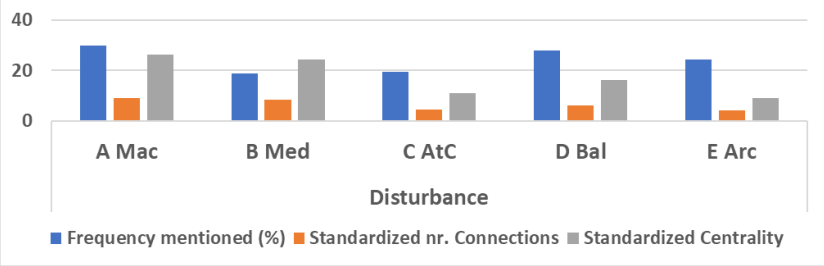
Demographics



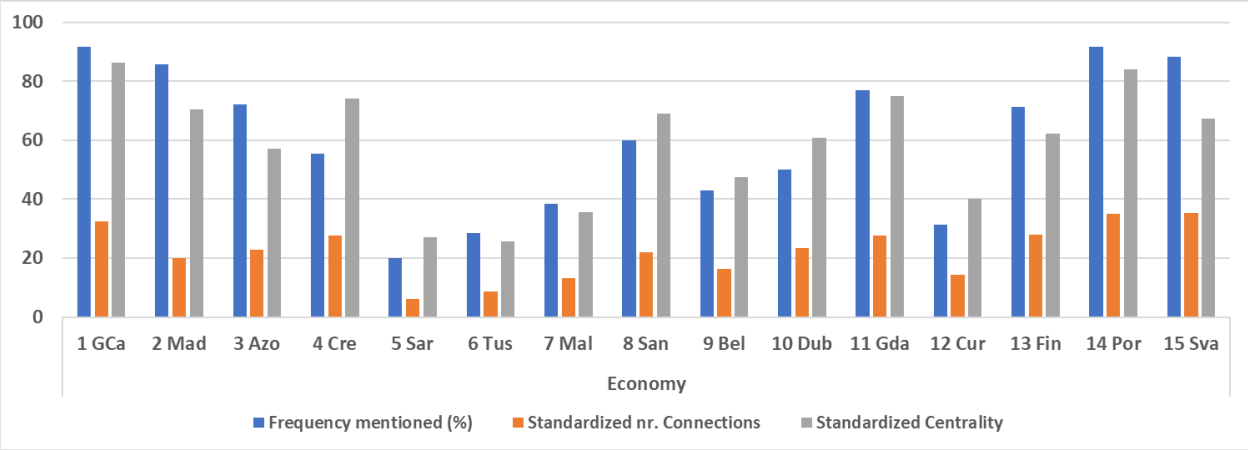



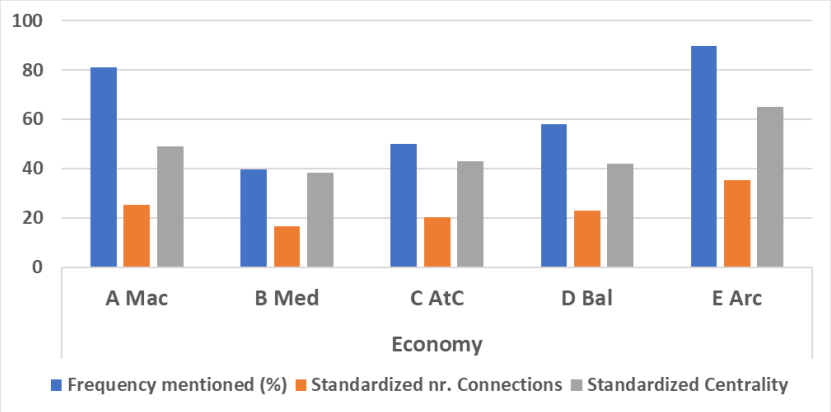

Disturbance



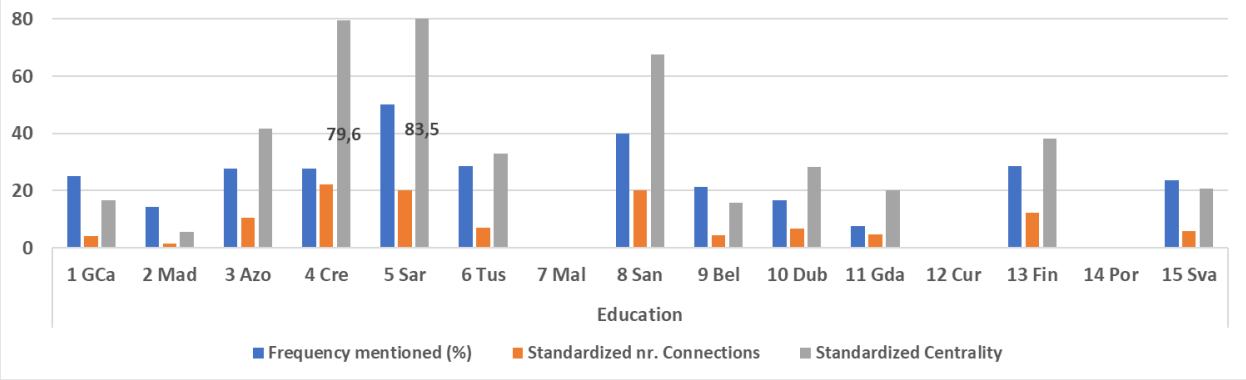



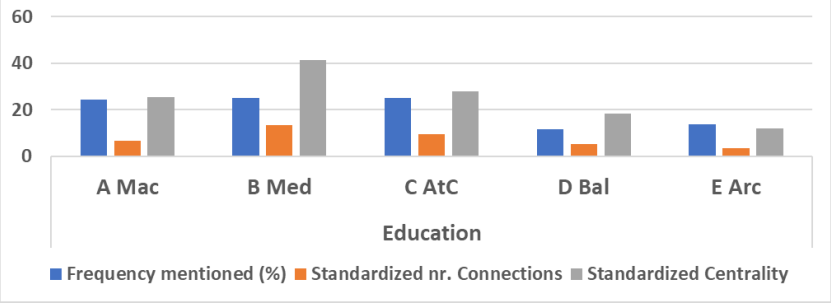
Economy



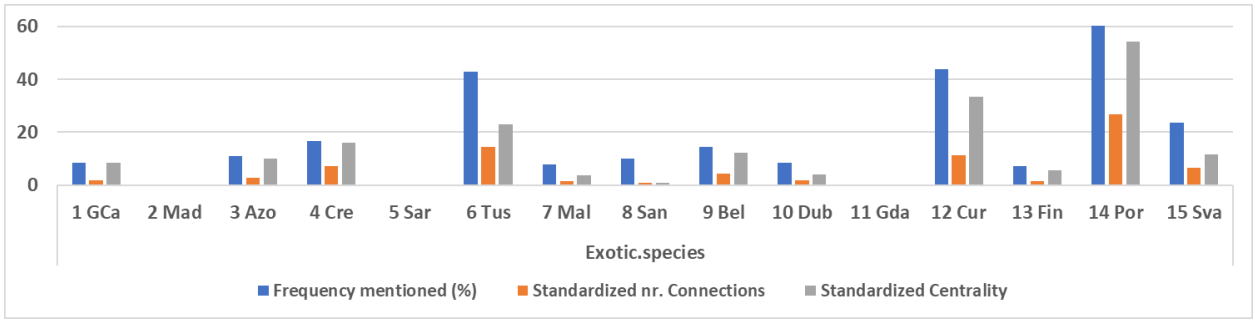



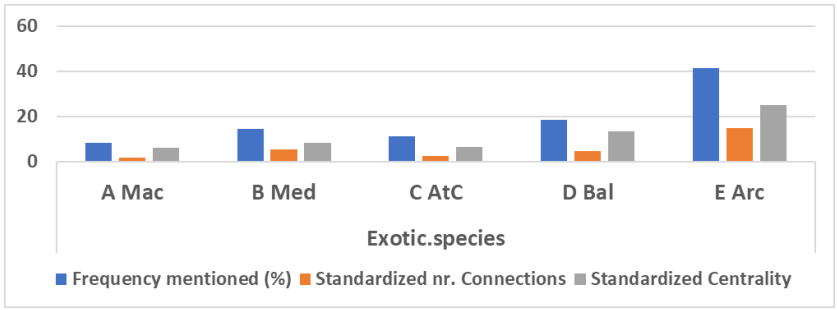

Education



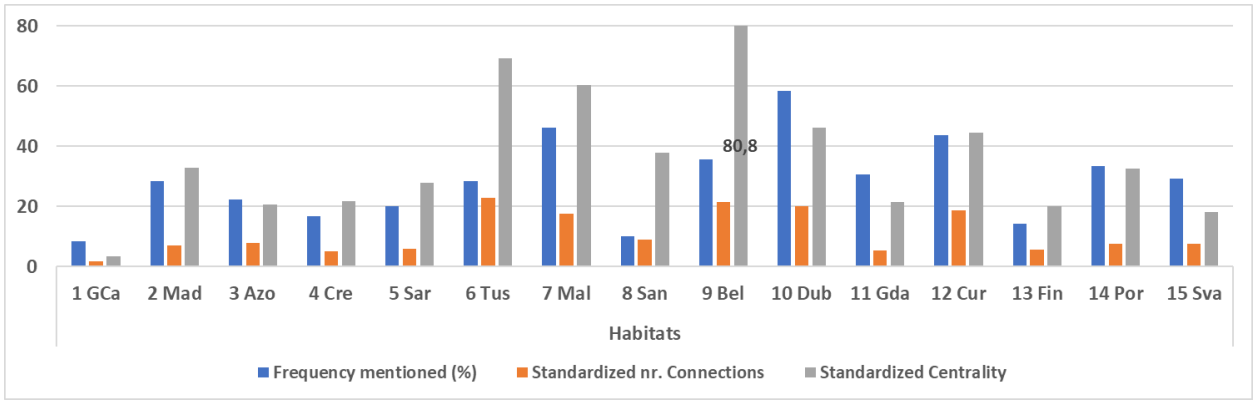



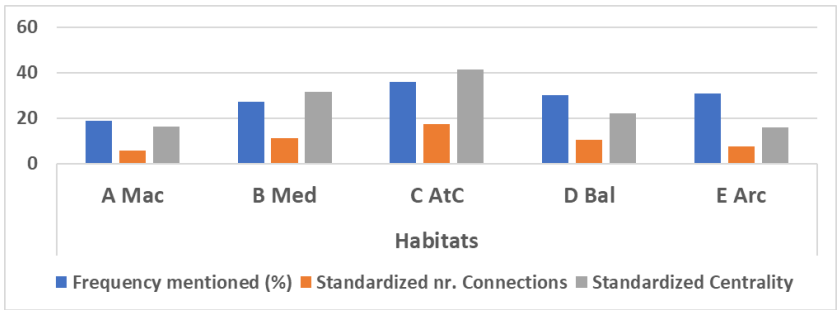
Exotic Species



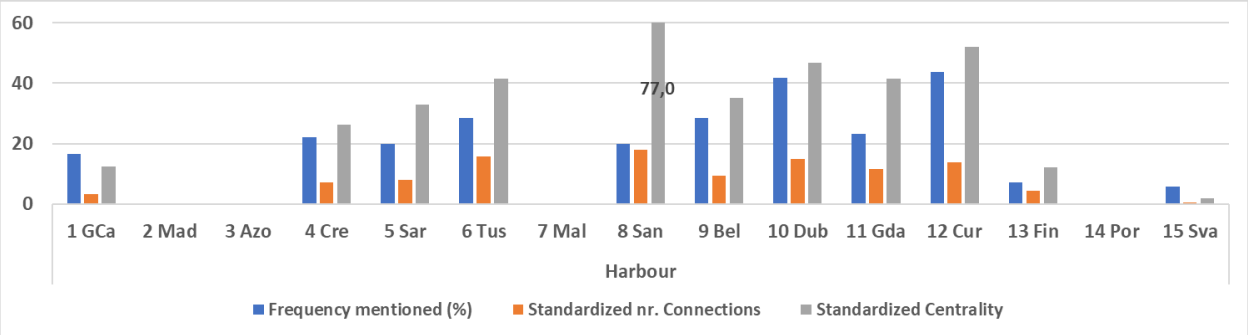



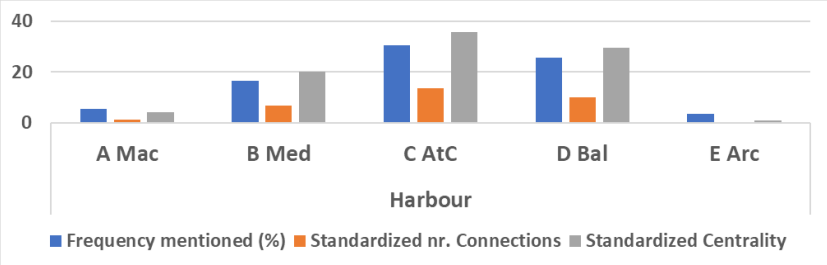

Habitats



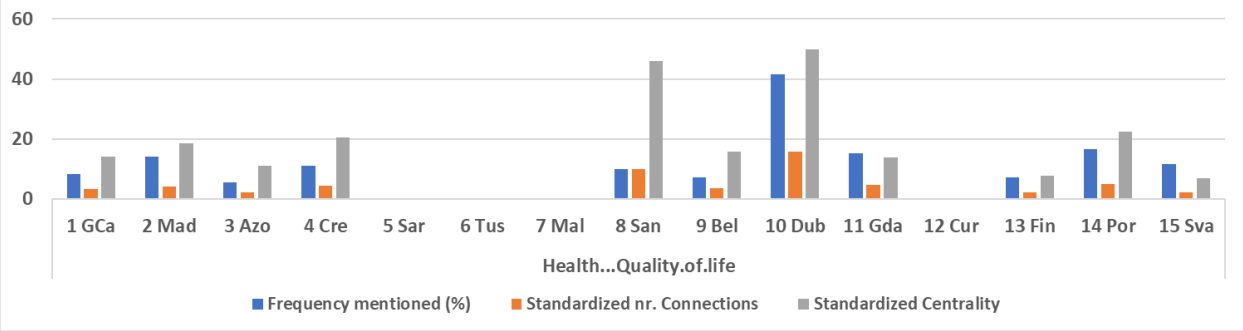



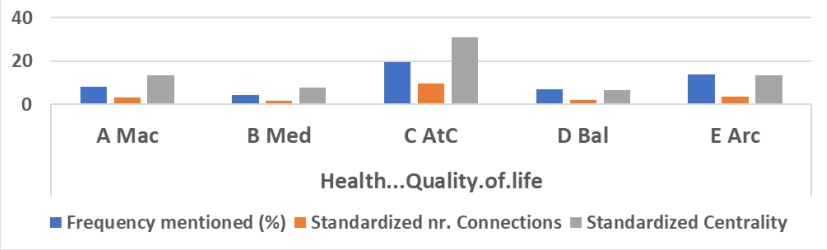
Harbour



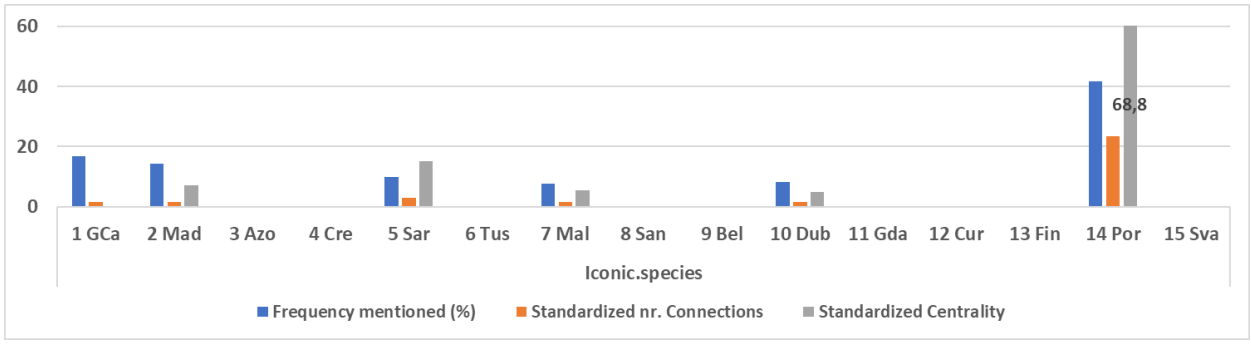



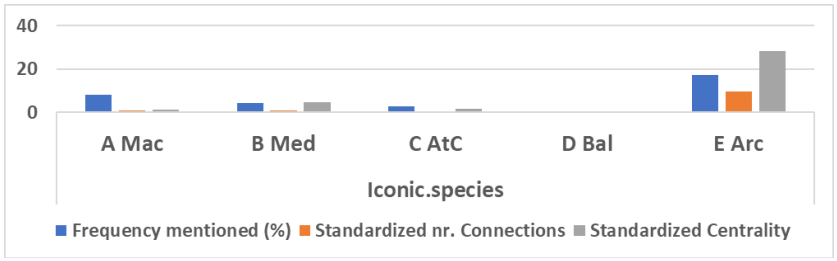

Health and Quality of Life



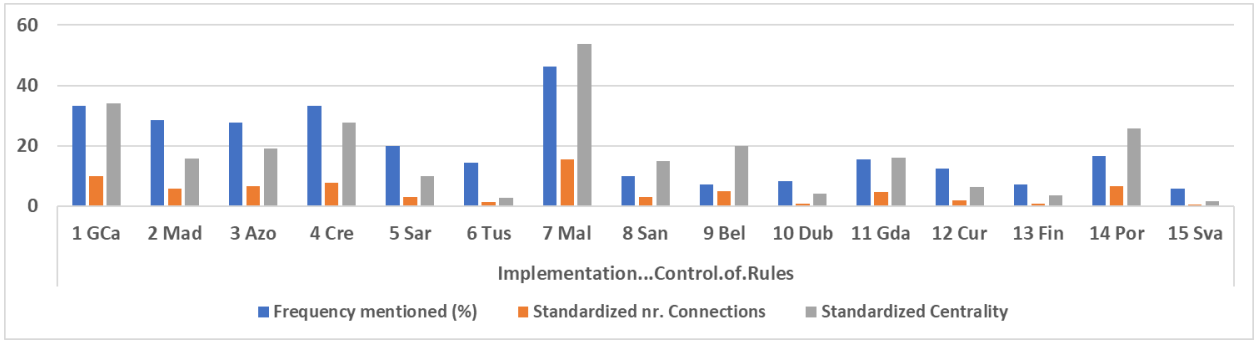



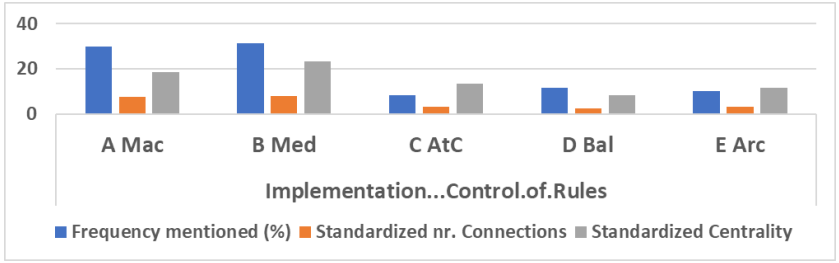
Iconic Species



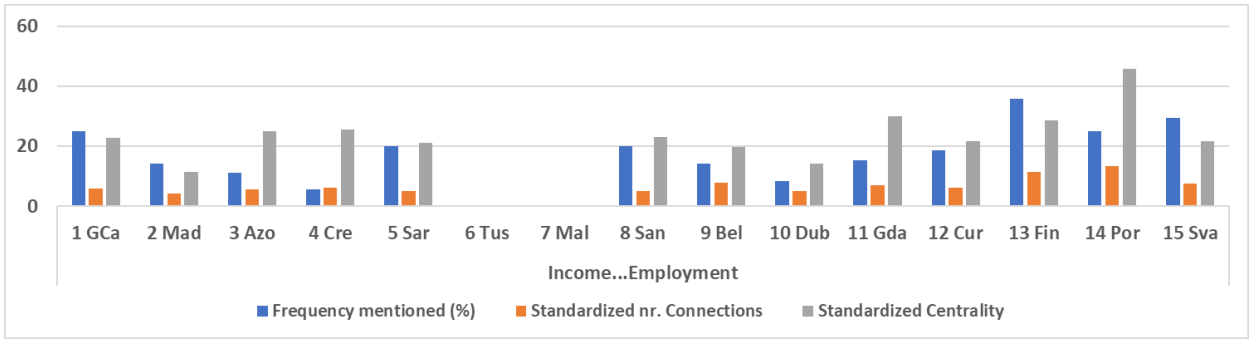



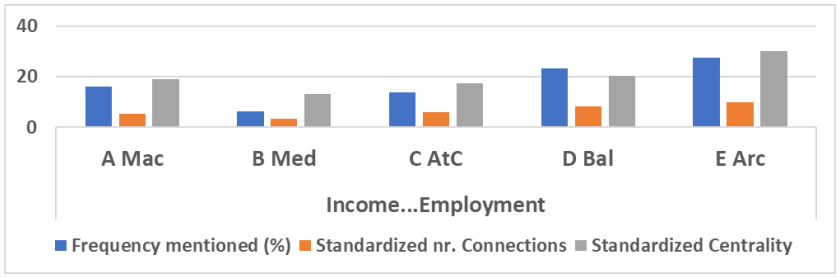

Implementation and Control of Rules



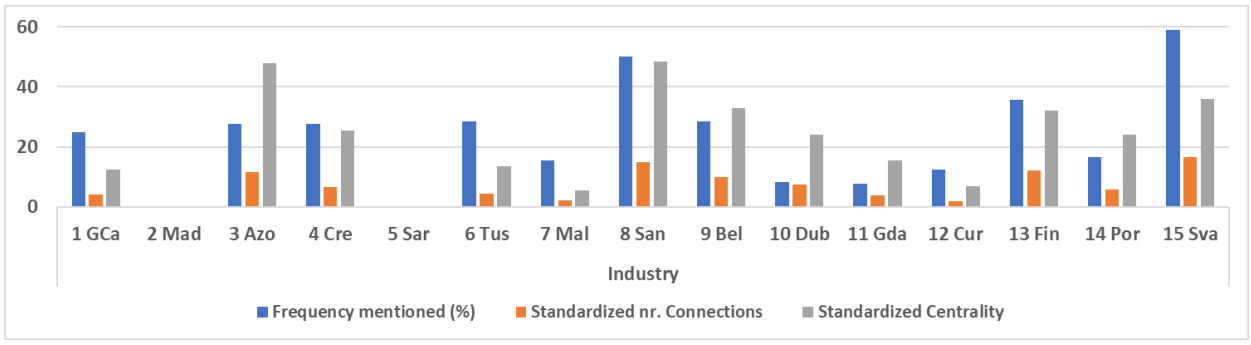



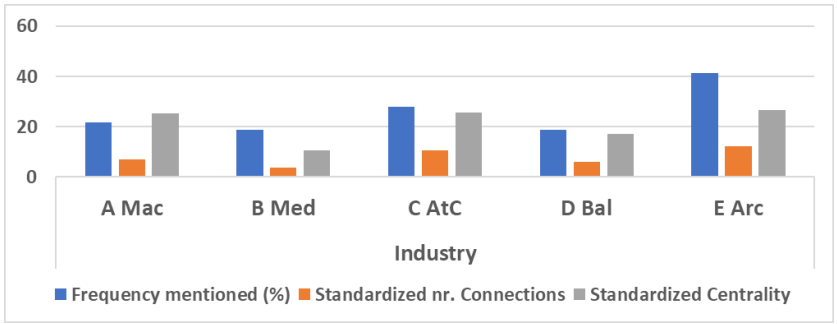
Income and Employment



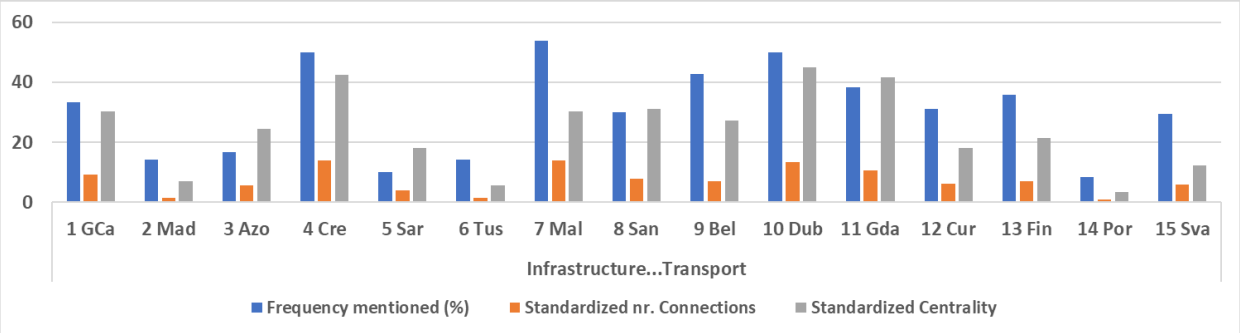



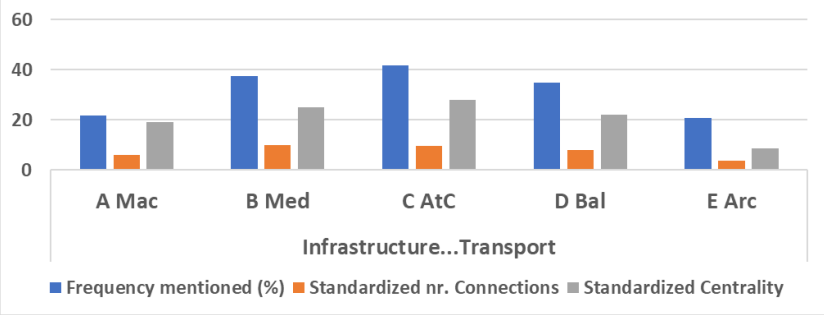

Industry



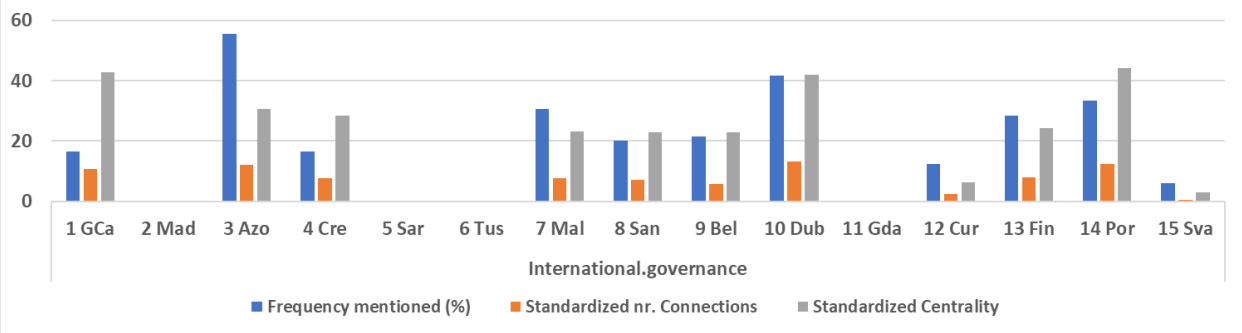



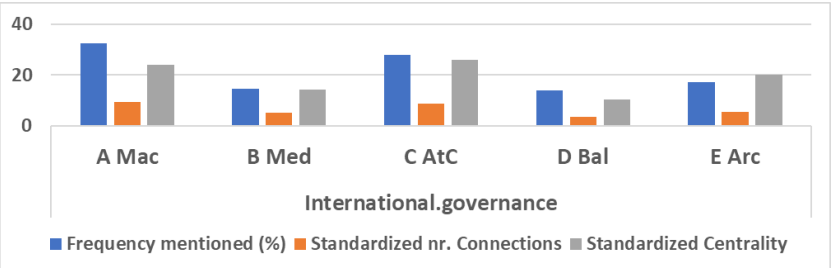
Infrastructure and Transport



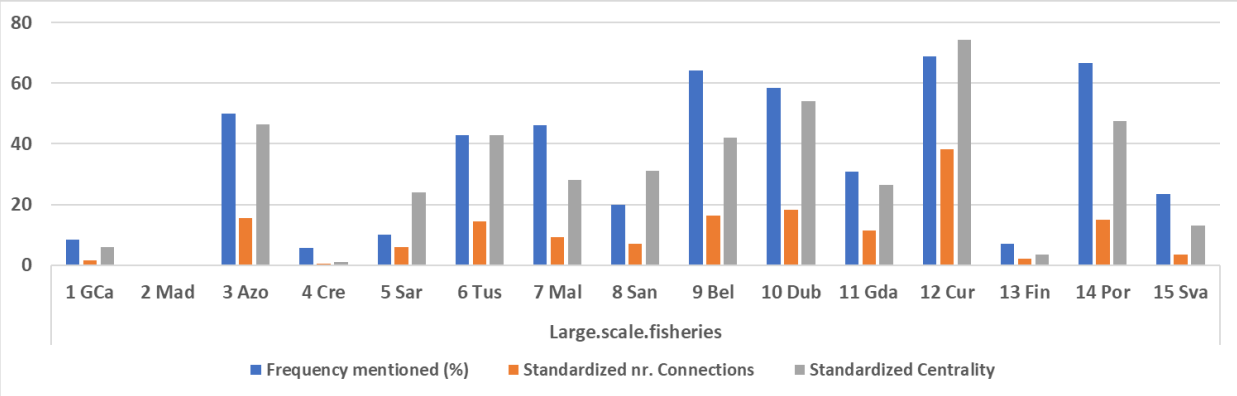



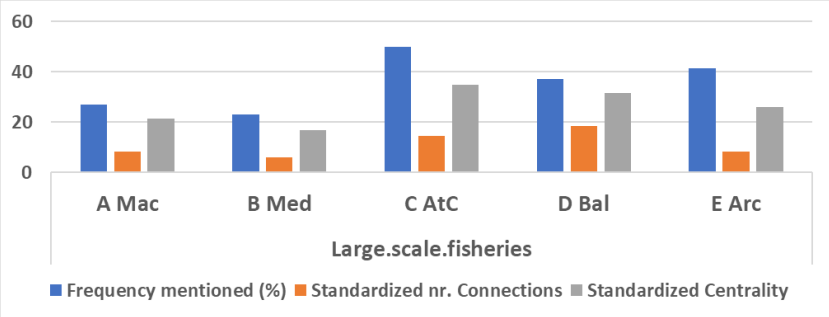

International Governance



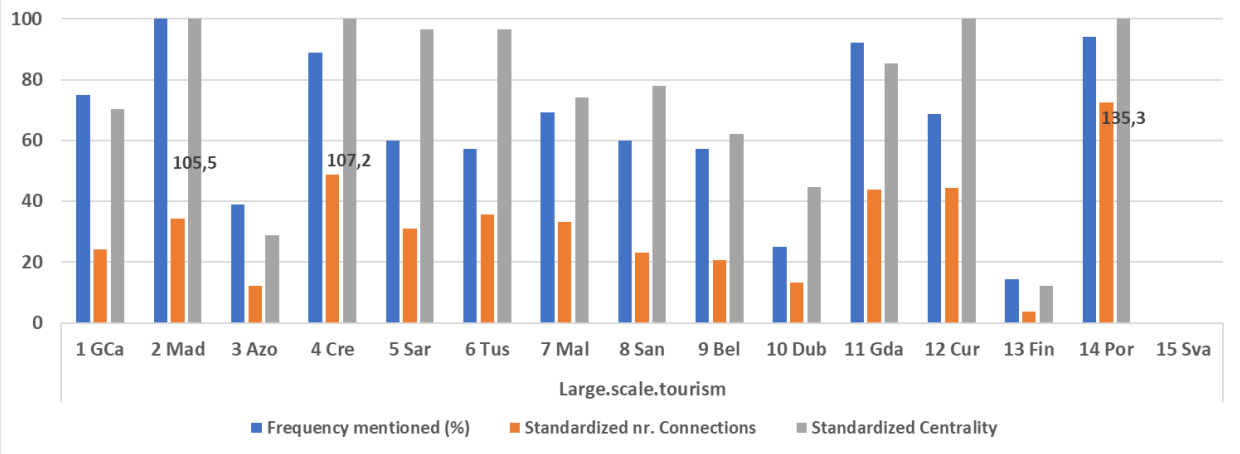



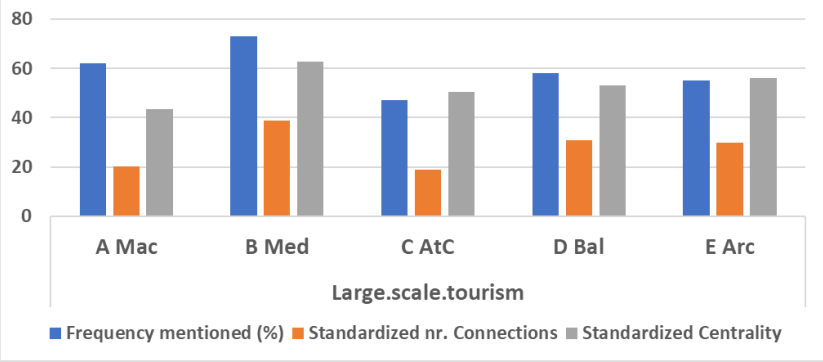
Large-scale Fisheries



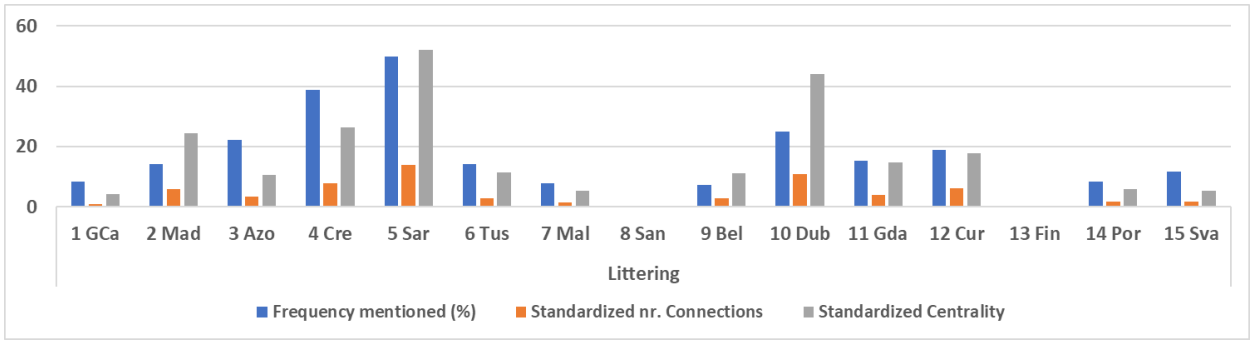



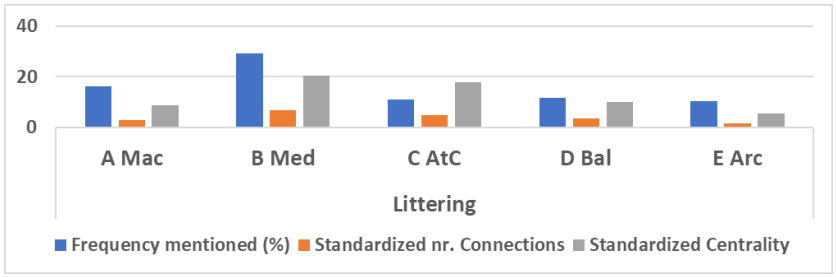

Large-scale Tourism



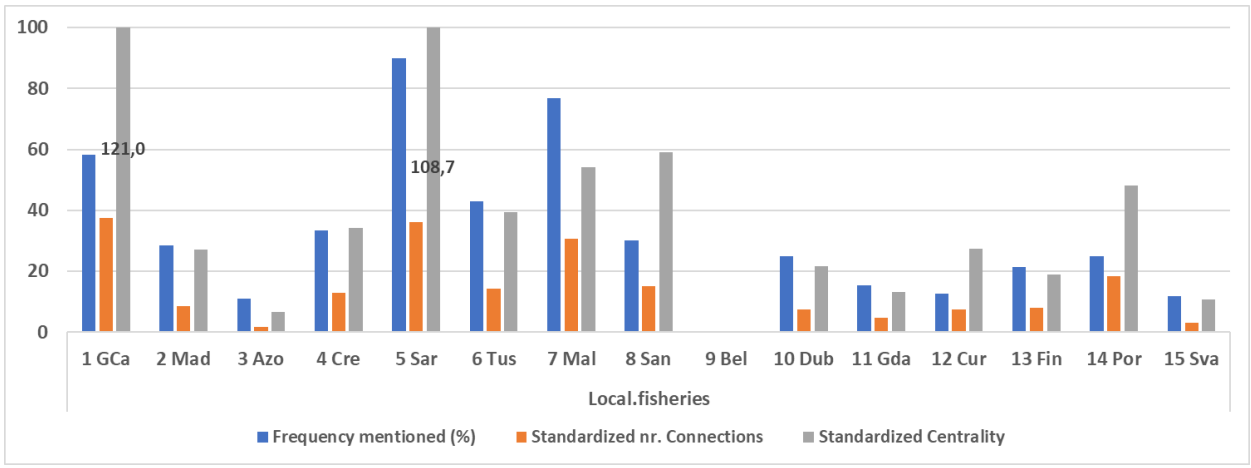



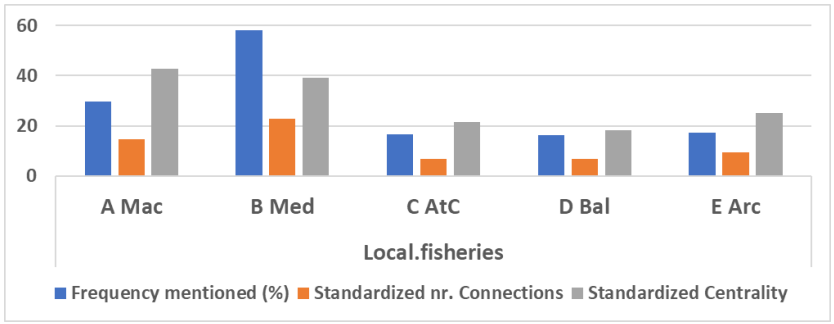
Littering



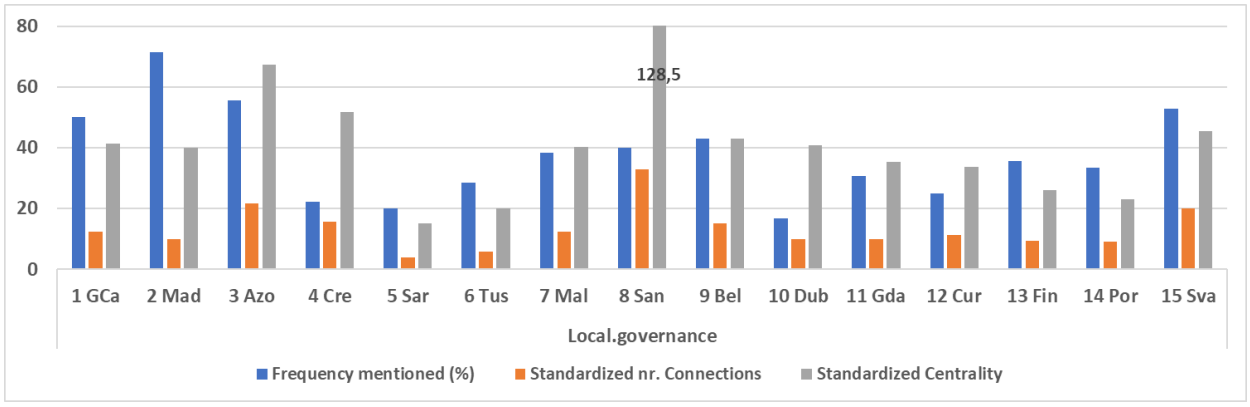



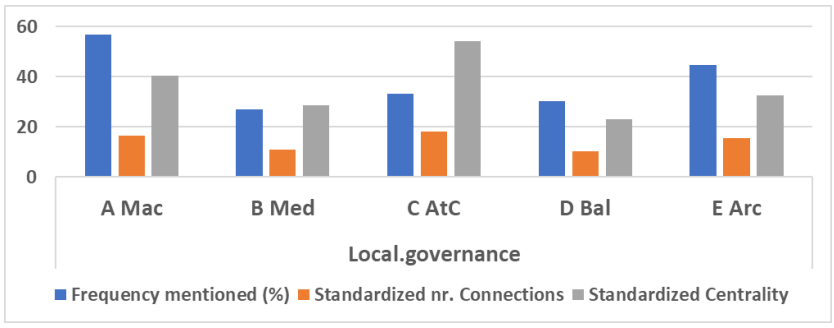

Local Fisheries



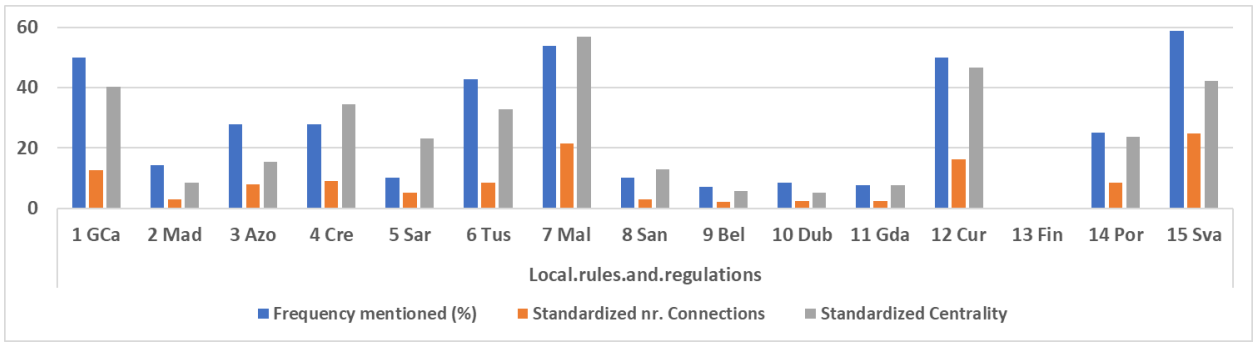



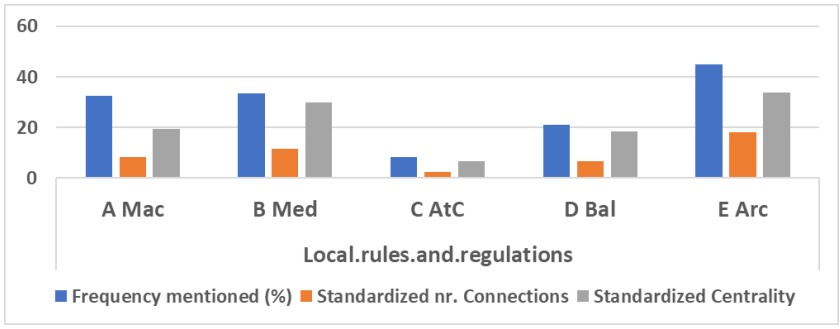
Local Governance



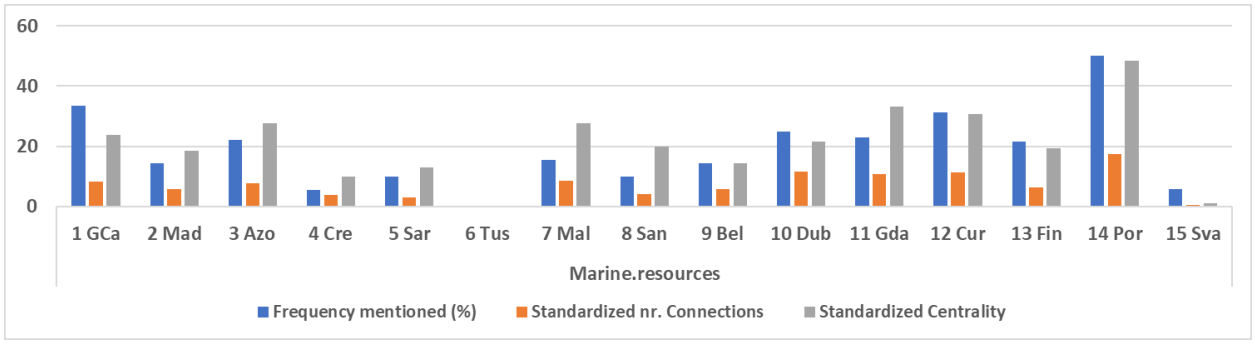



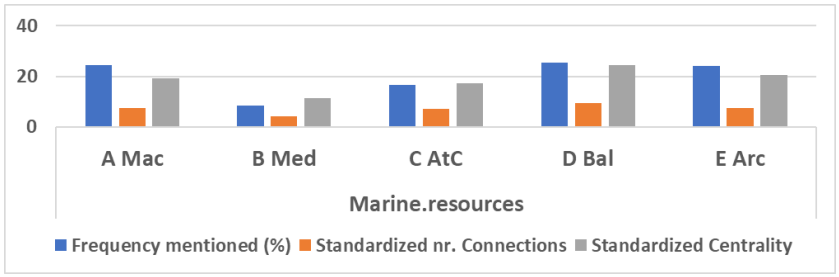

Local Rules and Regulations



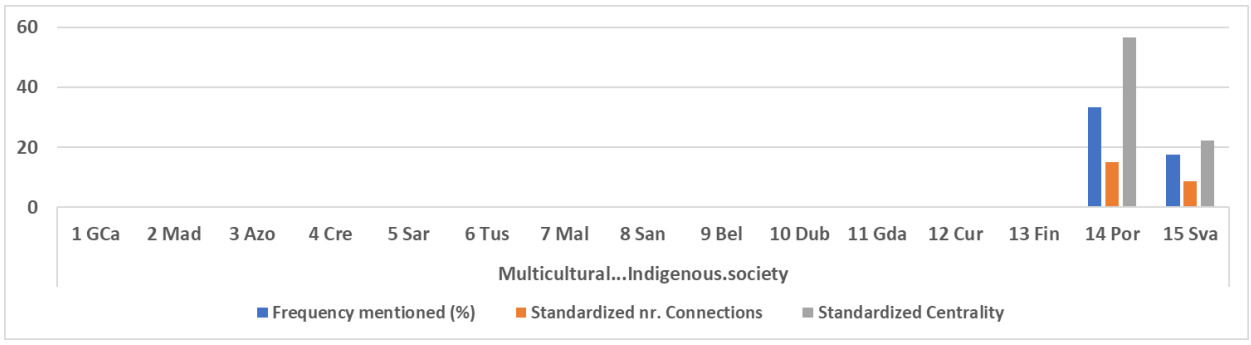



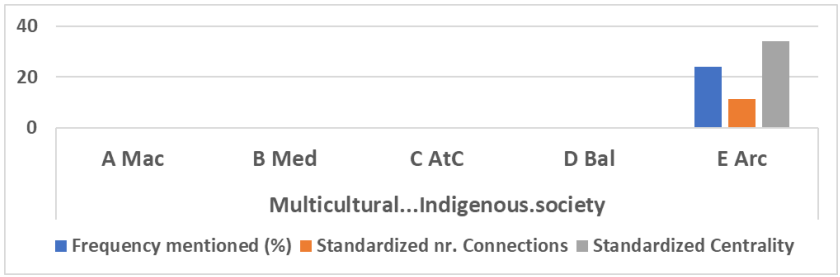
Marine Resources



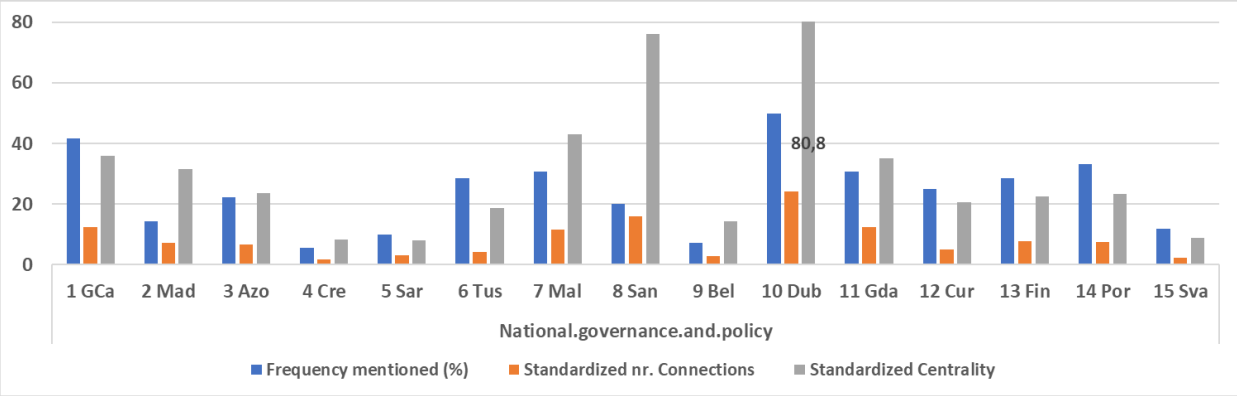



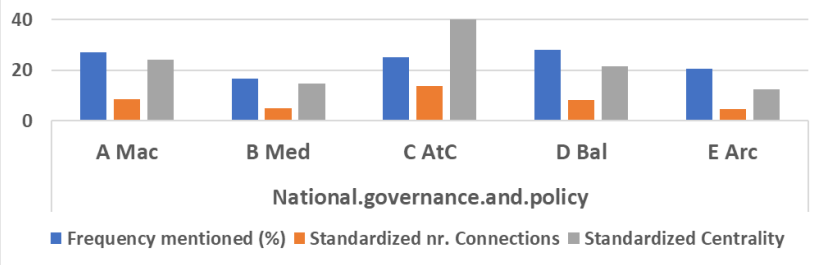

Multicultural and Indigenous Society



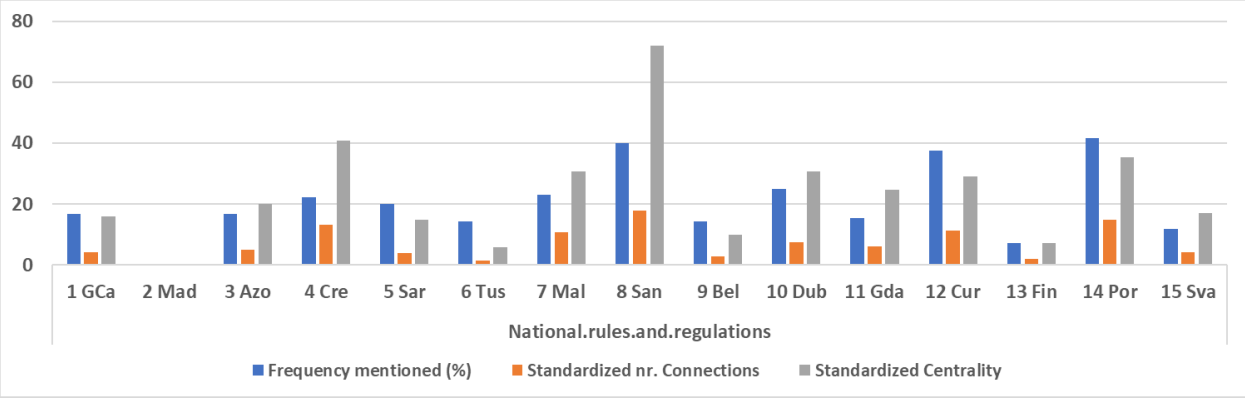



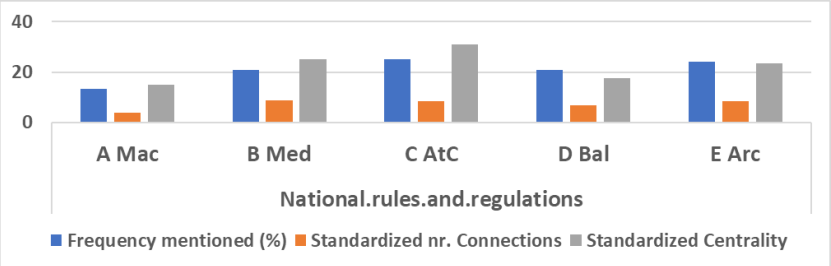
National governance and Policy



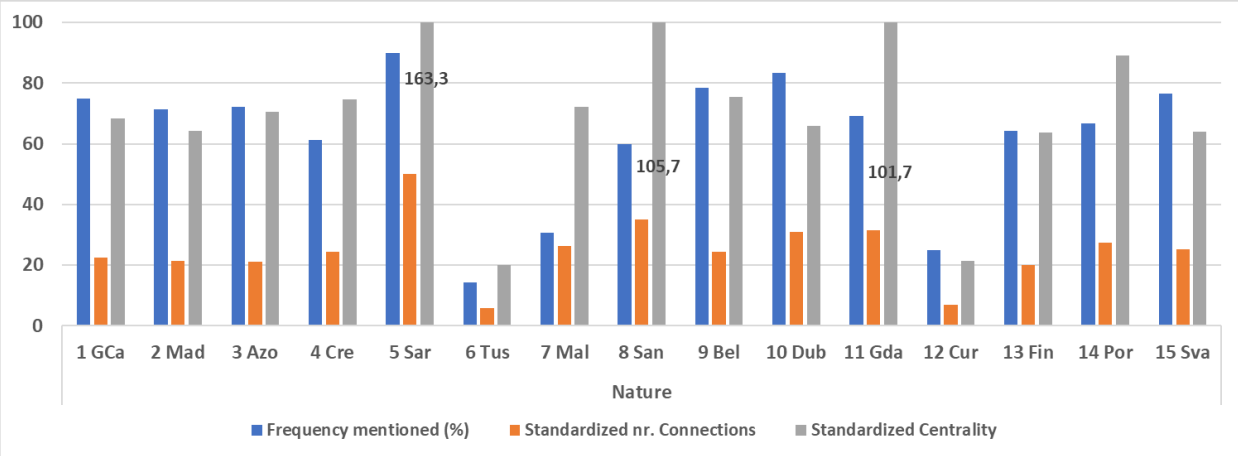



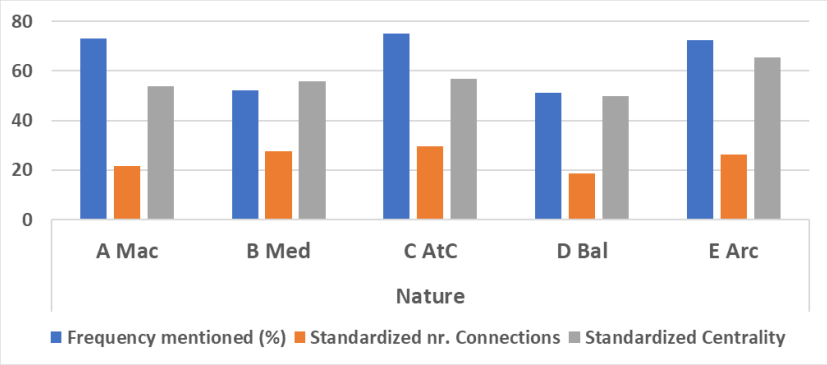

National rules and regulations



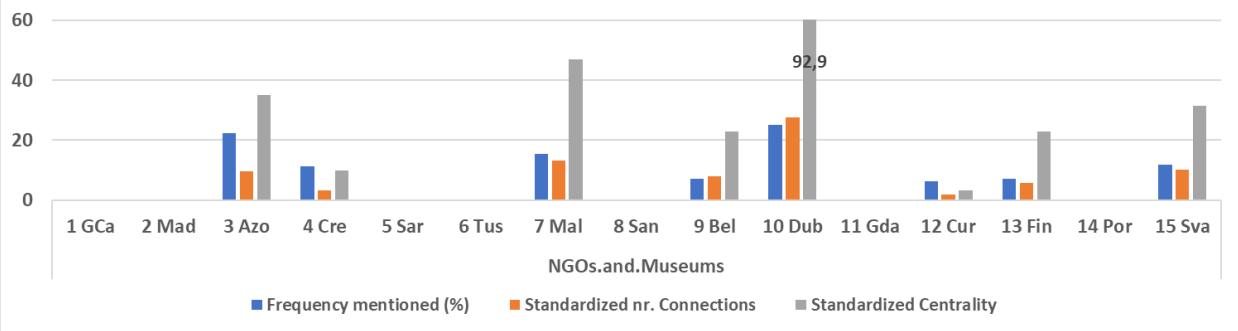



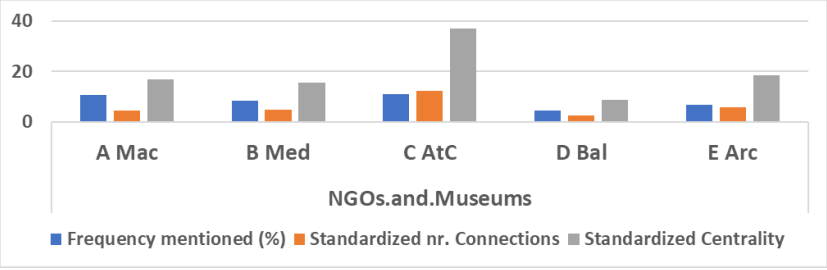
Nature



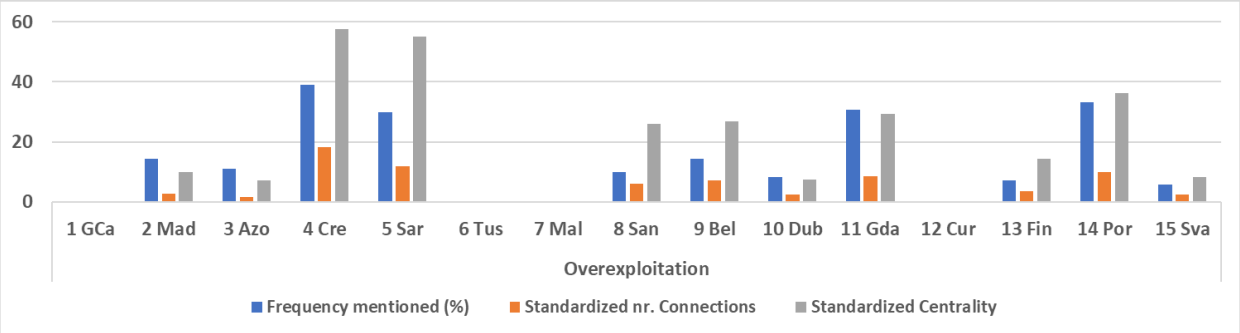



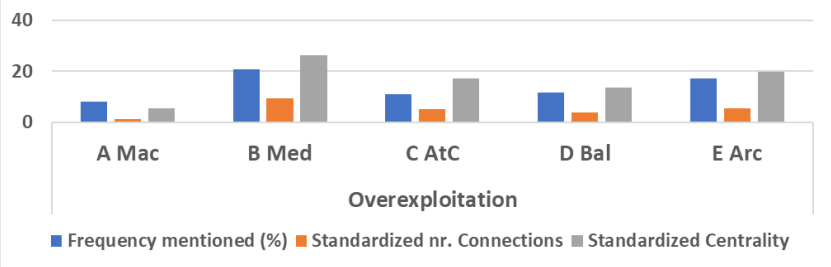

NGOs and Museums



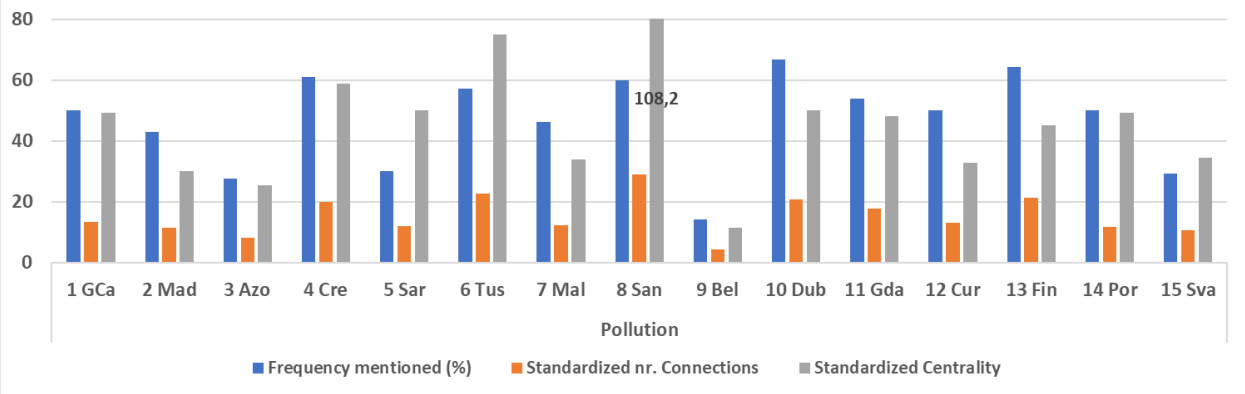



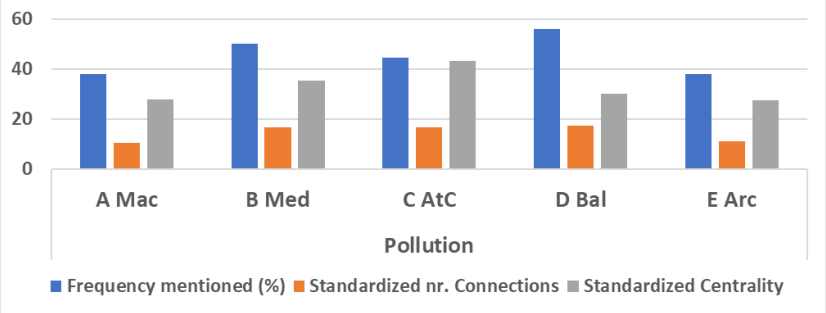
Overexploitation



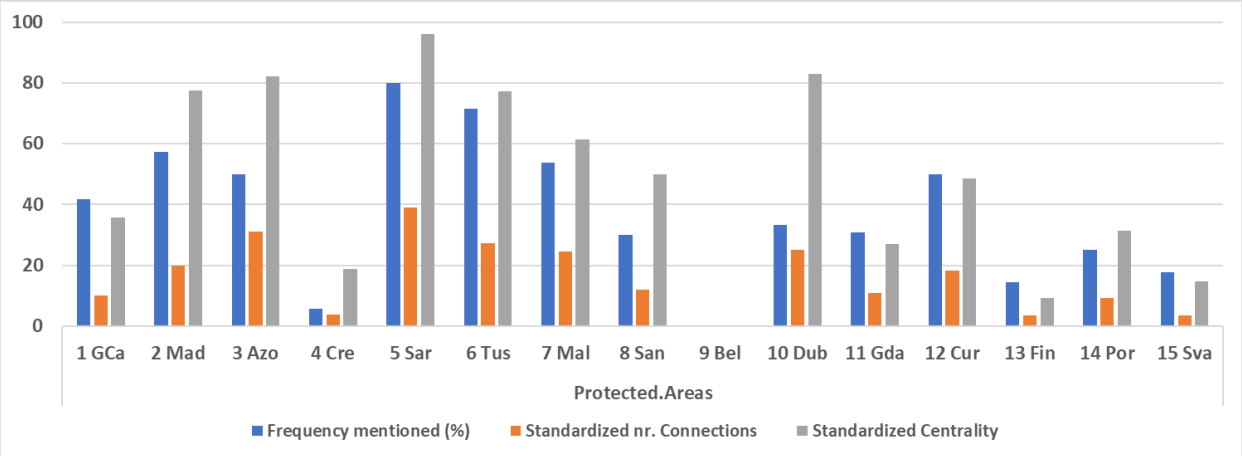



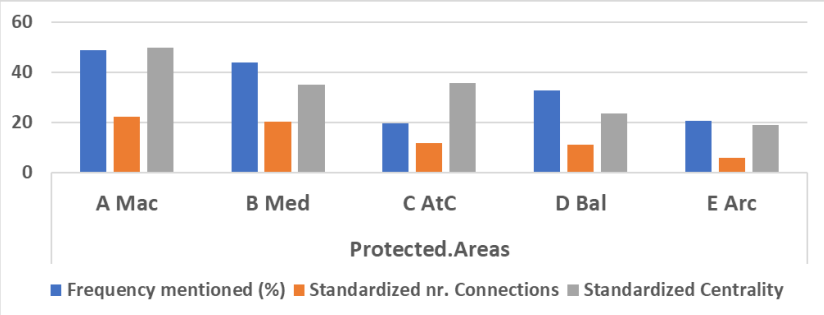

Pollution



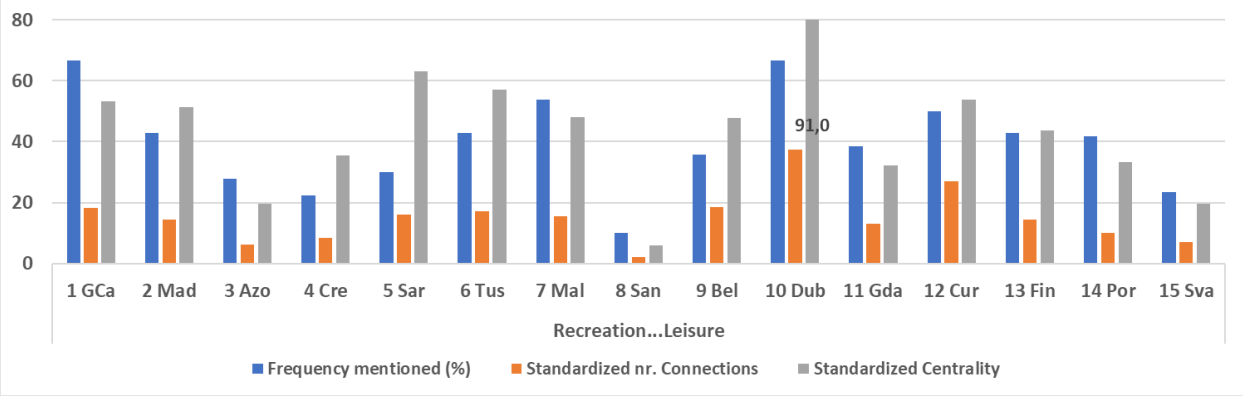



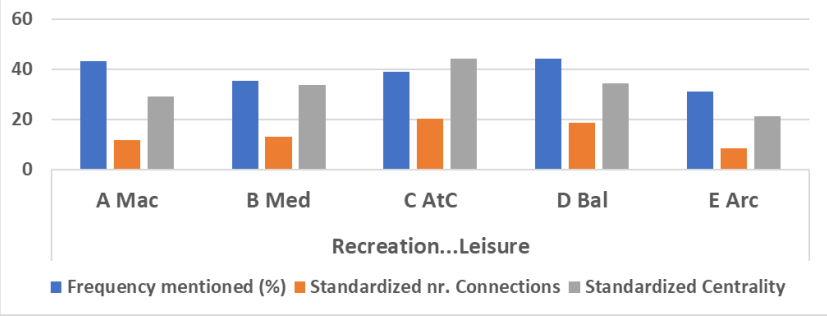
Protected Areas



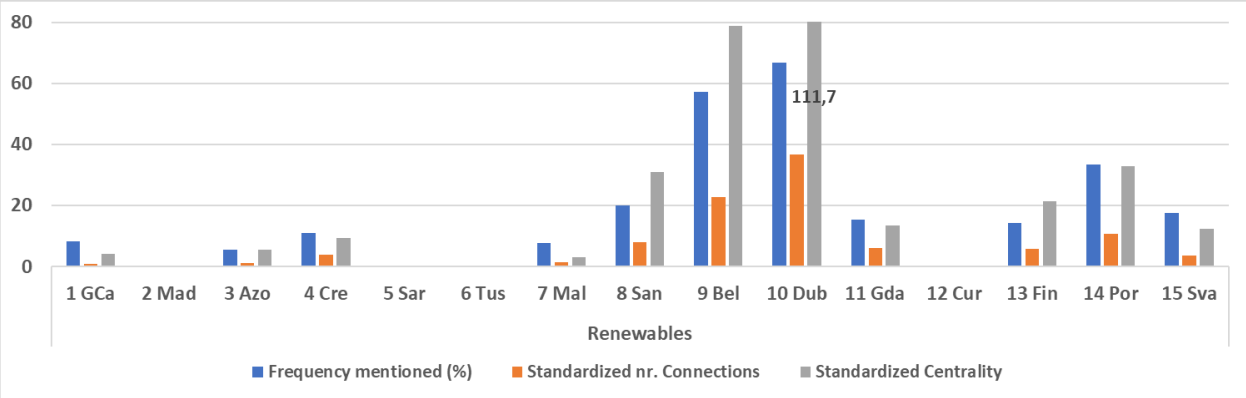



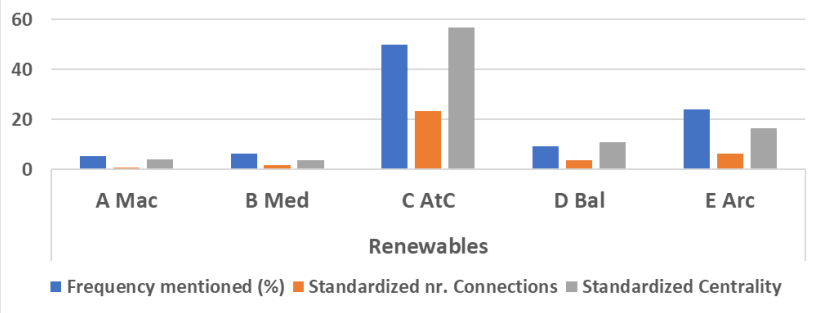

Recreation and Leisure



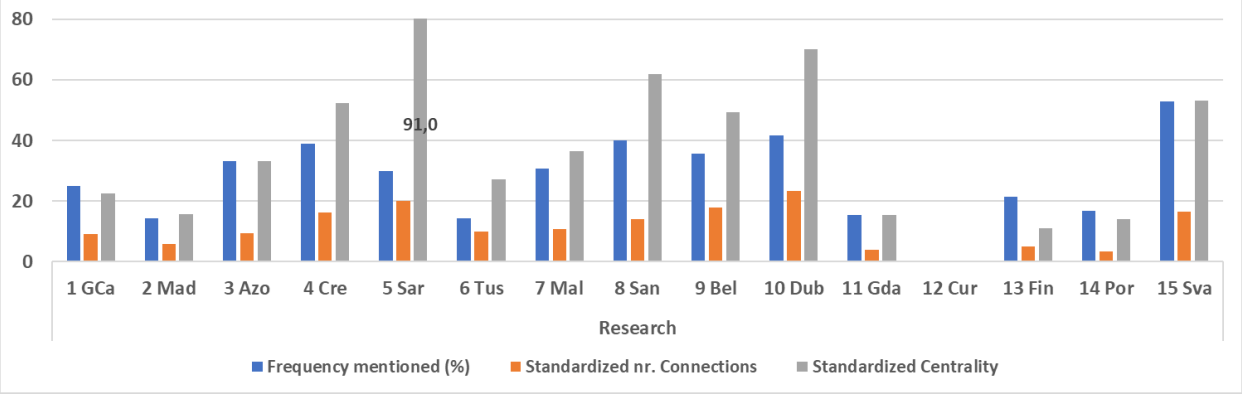



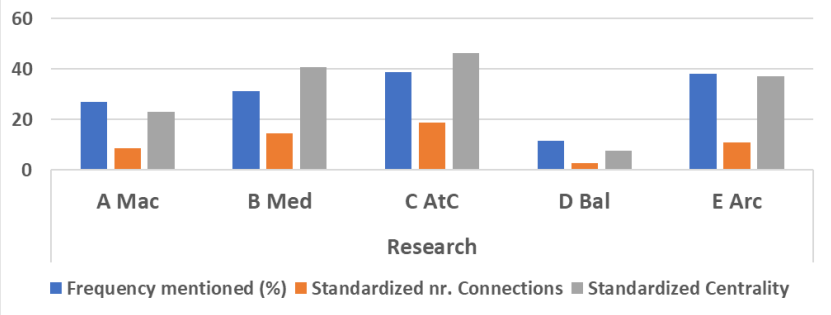
Renewables



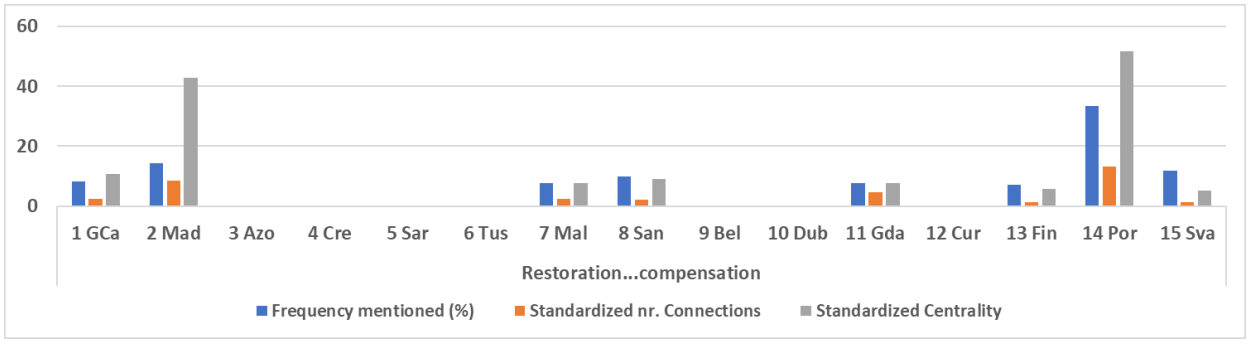



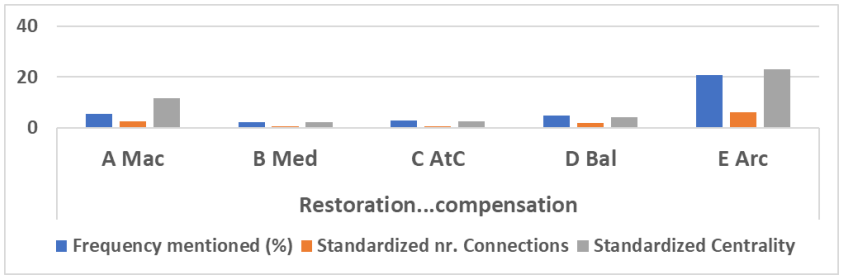

Research



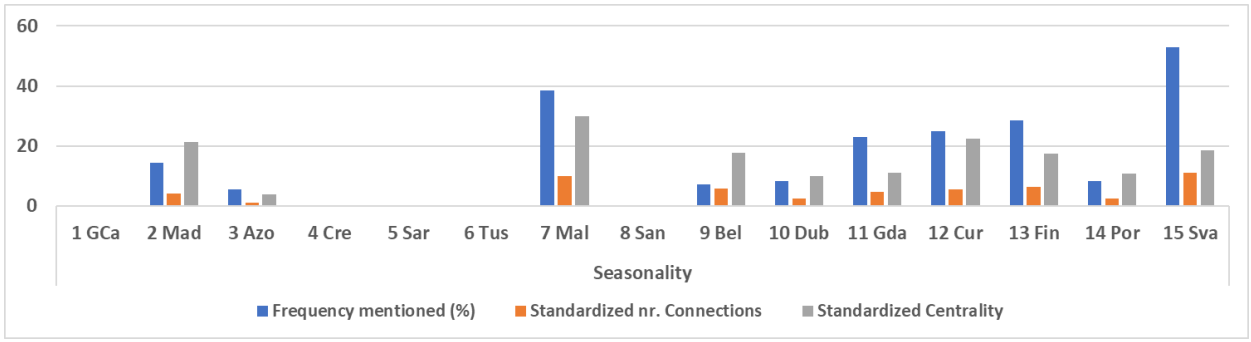



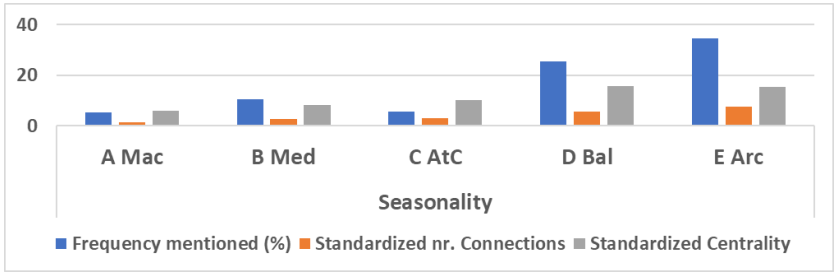
Restoration and Compensation



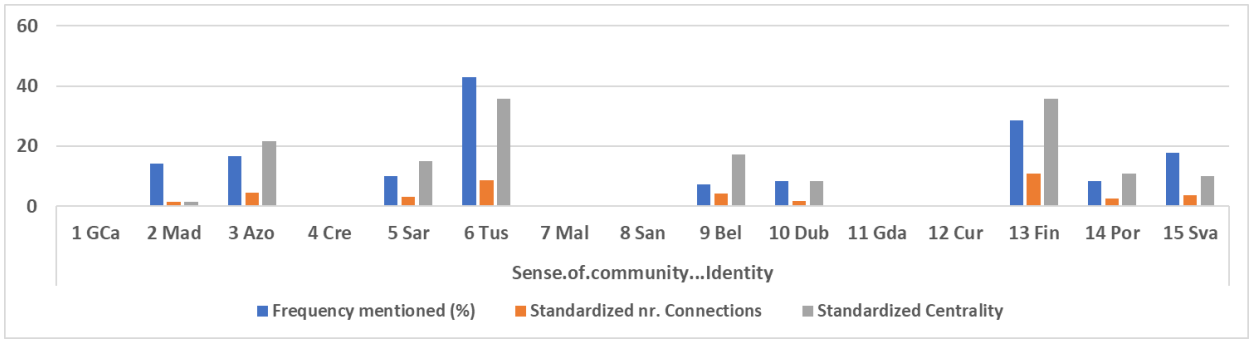



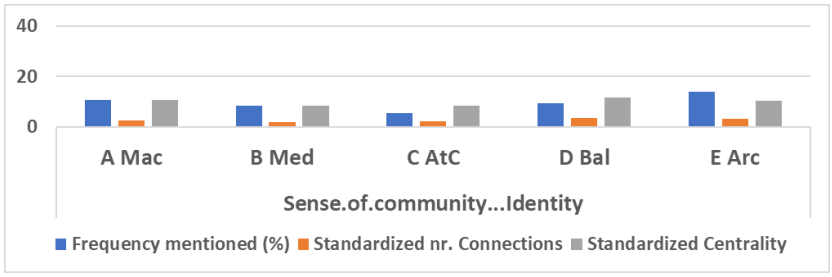

Seasonality



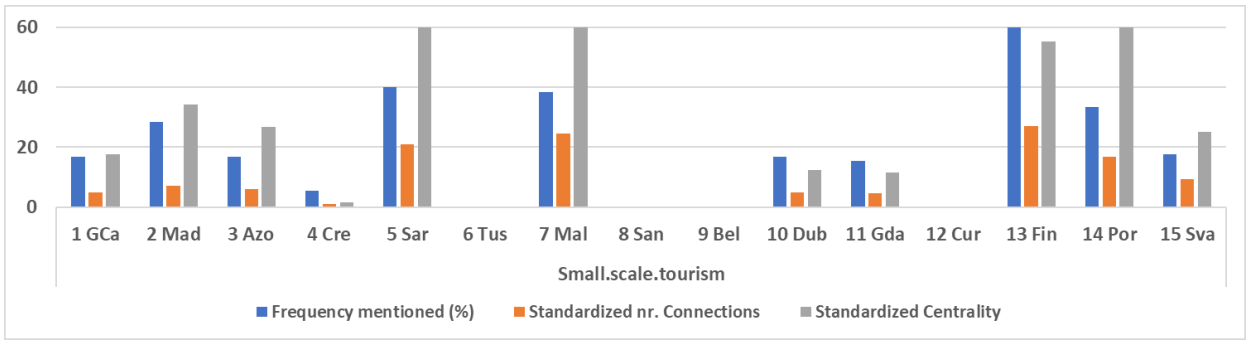



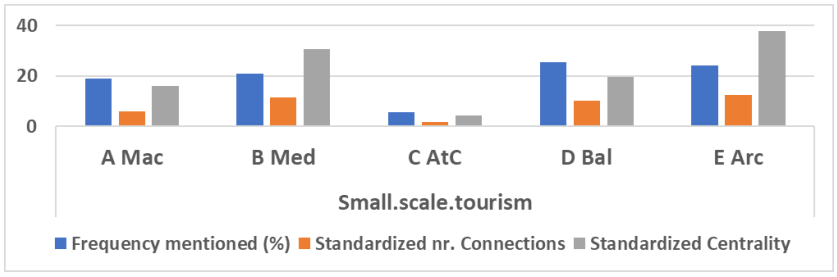
Sense of Community



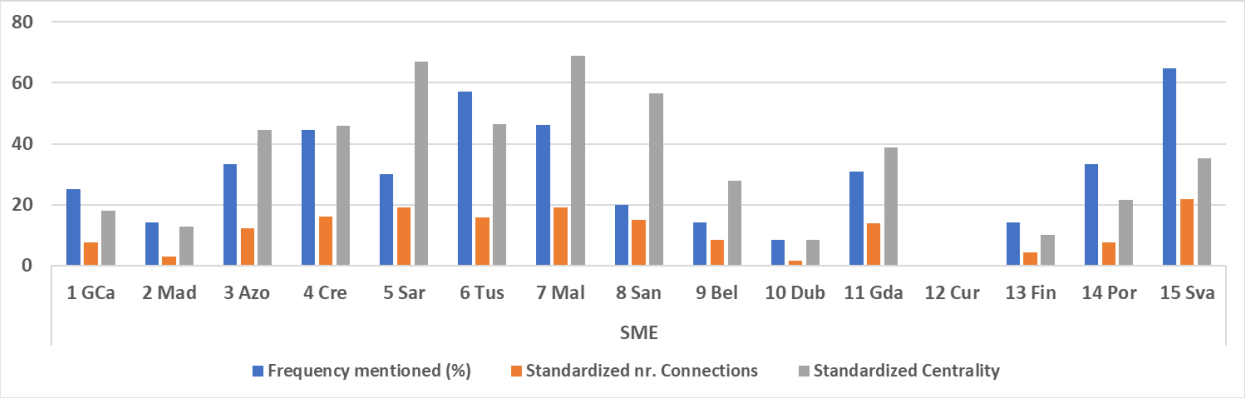




Small-scale Tourism



SME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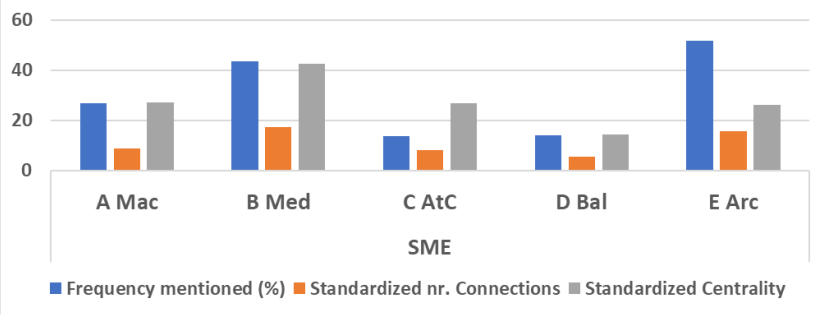
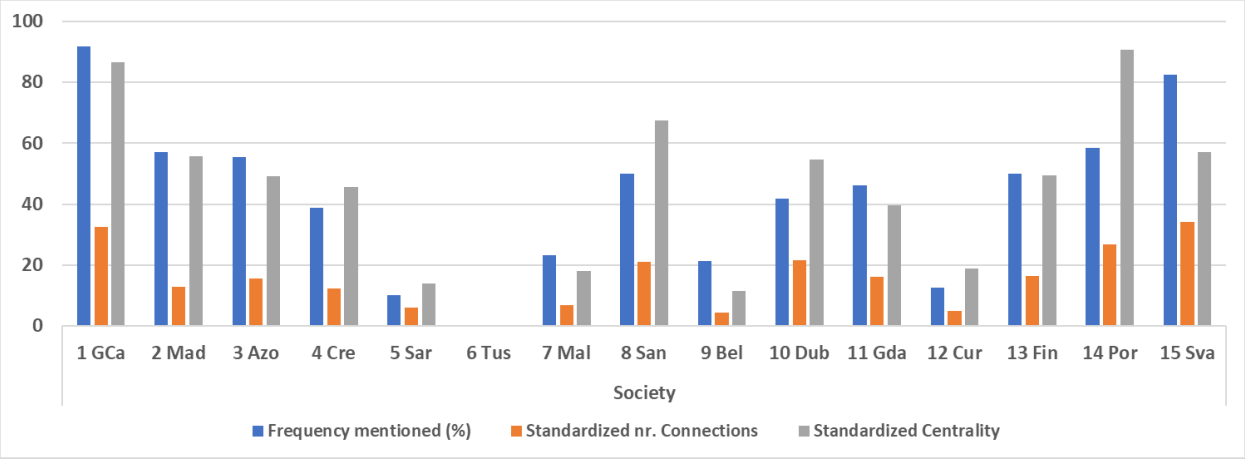
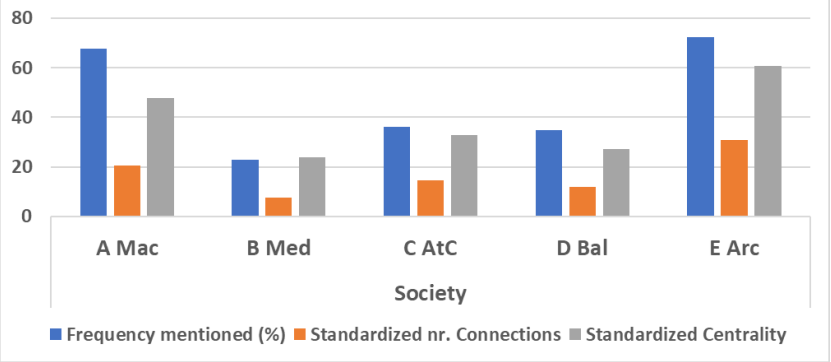
60
40
20
0
1 GCa
2 Mad
3 Azo
4 Cre
5 Sar
6 Tus
7 Mal
8 San
9 Bel
10 Dub
11 Gda
12 Cur
13 Fin
14 Por
15 Sva
SME
Frequency mentioned (%)
Standardized nr. Connections
Standardized Centrality

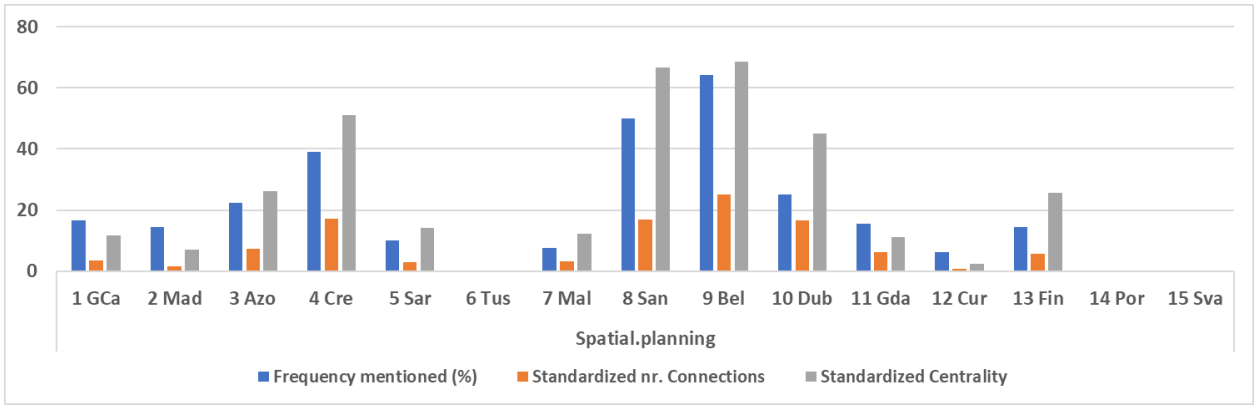

60
40
20
0
A Mac
B Med
C AtC
D Bal
E Arc
SME
Frequency mentioned (%)
Standardized nr. Connections
Standardized Centrality

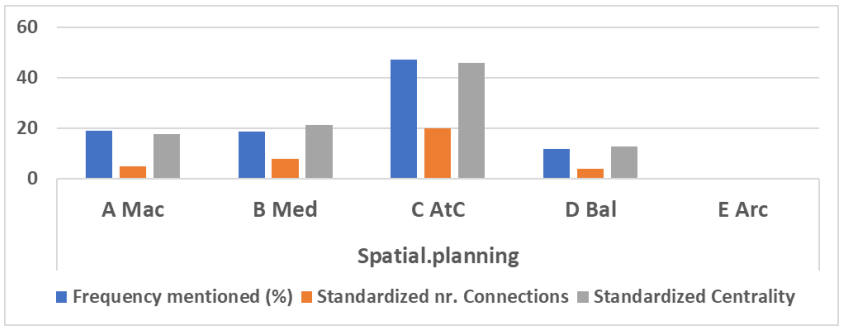
Society


100
80
60
40
20
0
1 GCa
2 Mad
3 Azo
4 Cre
5 Sar
6 Tus
7 Mal
8 San
9 Bel
10 Dub
11 Gda
12 Cur
13 Fin
14 Por
15 Sva
Society
Frequency mentioned (%)
Standardized nr. Connections
Standardized Centrality

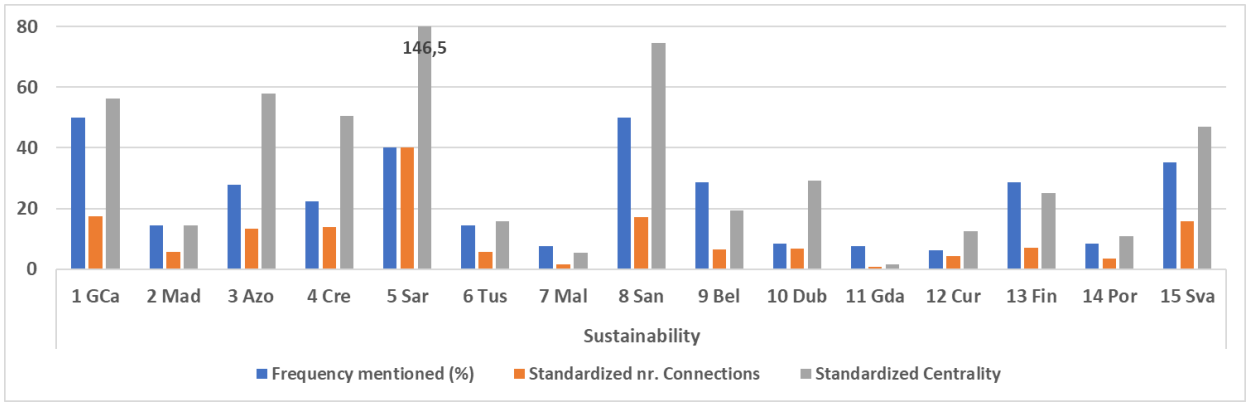

80
60
40
20
0
A Mac
B Med
C AtC
D Bal
E Arc
Society
Frequency mentioned (%)
Standardized nr. Connections
Standardized Centrality

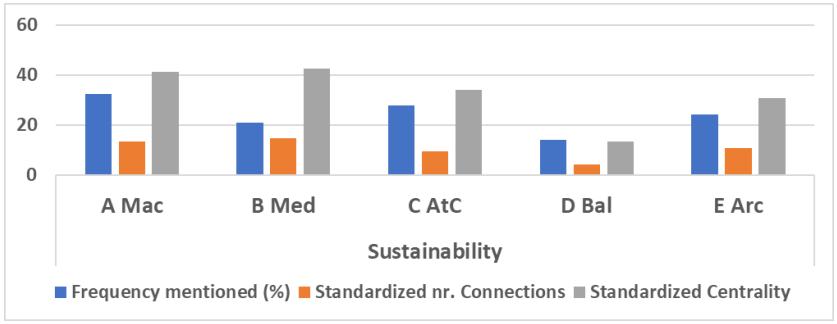
Spatial Planning



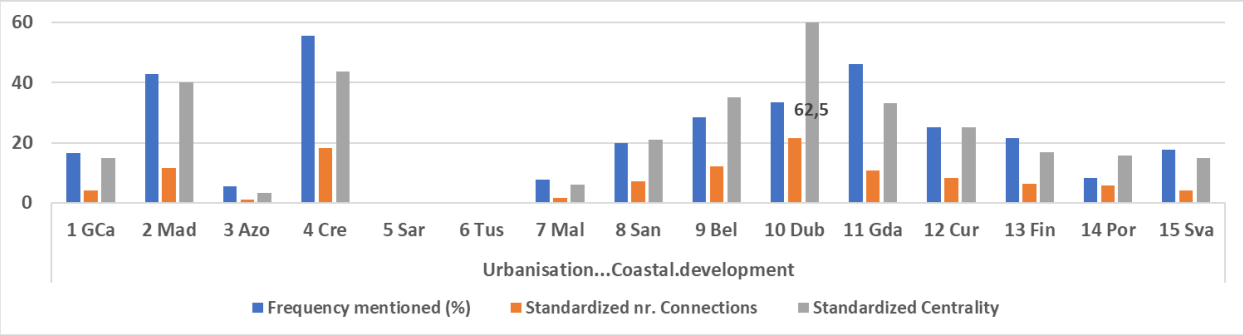



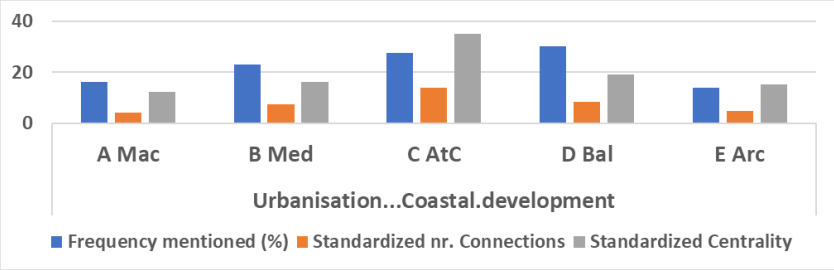

Sustainability



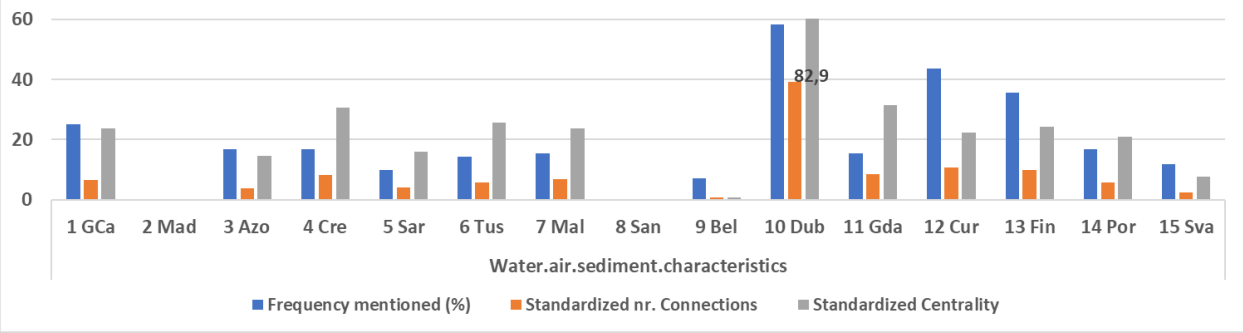



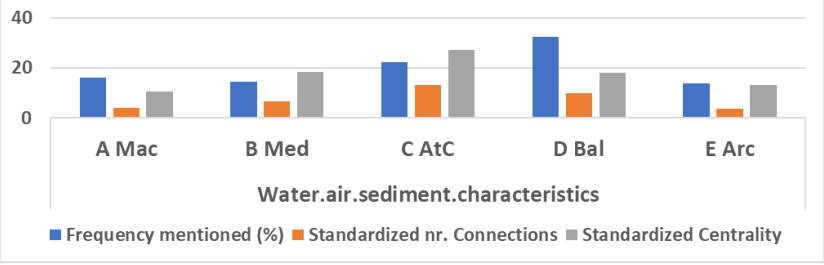
Urbanisation and Coastal Development




Water, Air, and Sediment (geophysical) Characteristics



# Appendix 11. Combinations of elements at research areas

Indicated are the combinations (pairs) of elements that were mentioned in at least 3 interviews in a research area, or in case the maximum of interviews a specific pair was mentioned was higher than 6 the other combinations in that area had to occur in more than 50 % of the number of interviews in that area.

Abbreviations: 1 GCa= Gran Canaria, 2 Mad= Madeira, 3 Azo= Azores, 4 Cre= Crete, 5 Sar= Sardinia, 6 Tus= Tuscany, 7 Mal= Mallorca, 8 San= Santander, 9 Bel= Belgium, 10-Dub= Dublin and Liverpool, 11 Gda= Gdansk Bay, 12 Cur= Curonian lagoon, 13 Fin= Finnish archipelago, 14 Por= Porsanger, 15 Sva= Svalbard

| Research area | Sending Elements | Receiving Elements | Number of Interviews |
|---|---|---|---|
| **1 GCa** | Demographics | Society | 3 |
| | Large.scale.tourism | Demographics | 3 |
| | Large.scale.tourism | Economy | 4 |
| | Local.fisheries | Cultural.heritage...Traditions | 3 |
| | Research | Conservation | 3 |
| | Society | Awareness...Knowledge | 3 |
| **2 Mad** | Large.scale.tourism | Conservation | 3 |
| | Protected.Areas | Economy | 3 |
| **3 Azo** | Conservation | Biodiversity | 3 |
| | Conservation | Nature | 5 |
| | Economy | Society | 3 |
| | Implementation...Control.of. Rules | Protected.Areas | 3 |
| | International.governance | Local.governance | 3 |
| | Large.scale.tourism | Economy | 3 |
| | Local.governance | Economy | 3 |
| | Protected.Areas | Economy | 4 |
| | Protected.Areas | Large.scale.fisheries | 4 |
| | SME | Economy | 3 |
| | Spatial.planning | Protected.Areas | 3 |
| **4 Cre** | Economy | Large.scale.tourism | 4 |
| | Infrastructure...Transport | Large.scale.tourism | 4 |
| | Large.scale.tourism | Economy | 7 |
| | Large.scale.tourism | SME | 4 |
| | SME | Large.scale.tourism | 4 |
| **5 Sar** | Local.fisheries | Conservation | 3 |
| | Local.fisheries | Small.scale.tourism | 3 |
| | Nature | Large.scale.tourism | 4 |
| | Nature | Protected.Areas | 4 |
| | Protected.Areas | Biodiversity | 4 |
| | Protected.Areas | Conservation | 3 |
| | Protected.Areas | Large.scale.tourism | 3 |
| | Protected.Areas | Nature | 4 |
| **7 Mal** | Disturbance | Biodiversity | 3 |
| | Infrastructure...Transport | Biodiversity | 4 |
| | Infrastructure...Transport | Conservation | 3 |
| | Large.scale.fisheries | Biodiversity | 3 |
| | Large.scale.tourism | Biodiversity | 4 |

| | | | |
|---|---|---|---|
| | Large.scale.tourism | Economy | 4 |
| | Large.scale.tourism | Society | 3 |
| | Local.fisheries | Biodiversity | 4 |
| | Local.rules.and.regulations | Biodiversity | 3 |
| | Local.rules.and.regulations | Conservation | 3 |
| | Protected.Areas | Nature | 3 |
| **8 San** | Awareness...Knowledge | Nature | 3 |
| | Pollution | Nature | 3 |
| | Spatial.planning | Conservation | 3 |
| **9 Bel** | Large.scale.fisheries | Biodiversity | 3 |
| **10 Dub** | Geophysical..water..air..sediment..characteristics | Biodiversity | 4 |
| | Pollution | Geophysical..water..air..sediment..characteristics | 6 |
| | Recreation...Leisure | Awareness...Knowledge | 4 |
| **11 Gda** | Large.scale.tourism | Economy | 6 |
| | Large.scale.tourism | Nature | 4 |
| **12 Cur** | Accessibility | Large.scale.fisheries | 3 |
| | Agriculture | Pollution | 3 |
| | Biodiversity | Large.scale.tourism | 3 |
| | Biological.plagues...hazards | Large.scale.tourism | 4 |
| | Conflict.of.interests | Large.scale.fisheries | 3 |
| | Geophysical..water..air..sediment..characteristics | Large.scale.fisheries | 4 |
| | Geophysical..water..air..sediment..characteristics | Large.scale.tourism | 3 |
| | Local.governance | Large.scale.tourism | 3 |
| | Pollution | Large.scale.tourism | 4 |
| | Protected.Areas | Large.scale.tourism | 3 |
| | Recreation...Leisure | Large.scale.fisheries | 3 |
| | Recreation...Leisure | Large.scale.tourism | 3 |
| **13 Fin** | Agriculture | Pollution | 6 |
| | Aquaculture | Pollution | 4 |
| | Education | Awareness...Knowledge | 4 |
| | Small.scale.tourism | Economy | 6 |
| **14 Por** | Economy | Society | 4 |
| | Exotic.species | Economy | 4 |
| | Exotic.species | Iconic.species | 4 |
| | Iconic.species | Economy | 3 |
| | International.governance | Exotic.species | 3 |
| | Local.fisheries | Cultural.heritage...Traditions | 3 |
| **15 Sva** | Industry | Society | 6 |
| | Large.scale.tourism | Economy | 11 |

# Appendix 12: Annex - Simple SES design brief: The Arctic DA

MARINE SABRES

MARINE SABRES

Funded by the European Union

# Marine·SABRES·WP2·Deliverable·2.1·-·Annex¶

# Simple·SES·design·brief:¶ The·Arctic·DA¶

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# Table of Contents

# 1 Introduction

The purpose of WP2 is to conduct stakeholder engagement in the three Demonstration Areas (DAs). In this Annex to Deliverable 2.1, the stakeholder engagement protocol and methods in the Arctic DA will be discussed and preliminary results will be presented. These preliminary results include a specification of the priority components for the Arctic DA to be included in the Simple SES.

In the Arctic DA, the focus is on the pelagic ecosystem of the Northeast Atlantic and the commercial pelagic fisheries as a main anthropogenic impact originating from the three countries included in the study: Greenland, Iceland, and the Faroe Islands. This DA offers a unique opportunity to explore and understand the social-ecological system (SES) approach on an international scale, as there is a dire need for collaboration and agreements across borders to account for the ecological pressures caused by these commercial fisheries. In addition, because pelagic fishing activities are currently very profitable and industrialized, value generated from fishing activities not only impacts the individuals, local communities, and companies dependent on the fishing activity itself, but is also spread along the value chain to indirect beneficiaries such as processing/export companies, technical engineering and innovation sectors, and even international branches of the same companies. The nature of this focus, and the differing geographical, cultural, economic, and political landscape of each territory, called for a stakeholder engagement approach that differed from that utilized in the other MarineSabres DAs.

Regarding WP2, the purpose is to engage with stakeholders, to gather their opinions, thoughts, and wishes or priorities concerning the marine and coastal environment, its benefits, and any pressures impacting it. Stakeholder views were obtained through semi-structured interviews, with a mixture of open-ended questions and elements rated on a Likert scale. Interviews in the Faroe Islands were conducted by local partners and in the local language. In Iceland and Greenland, approximately half of the interviews are being conducted in the local language and half in English. The interviews are still ongoing in all three territories and will be completed in December.

The following sections will present and discuss the main activities carried out by WWF in Greenland, Blue Resource (Sjókovin) in the Faroe Islands, the Marine and Freshwater Research Institute in Iceland, and the Stefansson Arctic Institute in Iceland.

# 2 Methods

This section will explain the main methods for data collection used in the Arctic DA. Milestone 2.6 on the stakeholder engagement process in the Arctic DA contains more details.

## 2.1 Stakeholder mapping

Before collecting data, it was important to map potential stakeholders. This process relied on knowledge from project partners and also a review of catch data in order to better characterize the human aspects of the fishery (how many vessels, landing communities, etc). In a series of meetings, the Arctic DA team mapped relevant stakeholders (Figure 1). For each of the three territories, there will not be the exact same number or category of stakeholders since each territory has a slightly different relation to pelagic fisheries, but overall there will be a broad representation across the DA. In addition to the major stakeholders below, other stakeholders could be added to the informant list as needed but were not considered as crucial to the first step of stakeholder engagement, for example: tourism industry, local community members, offshore (wind, seabed mining), and shipping.

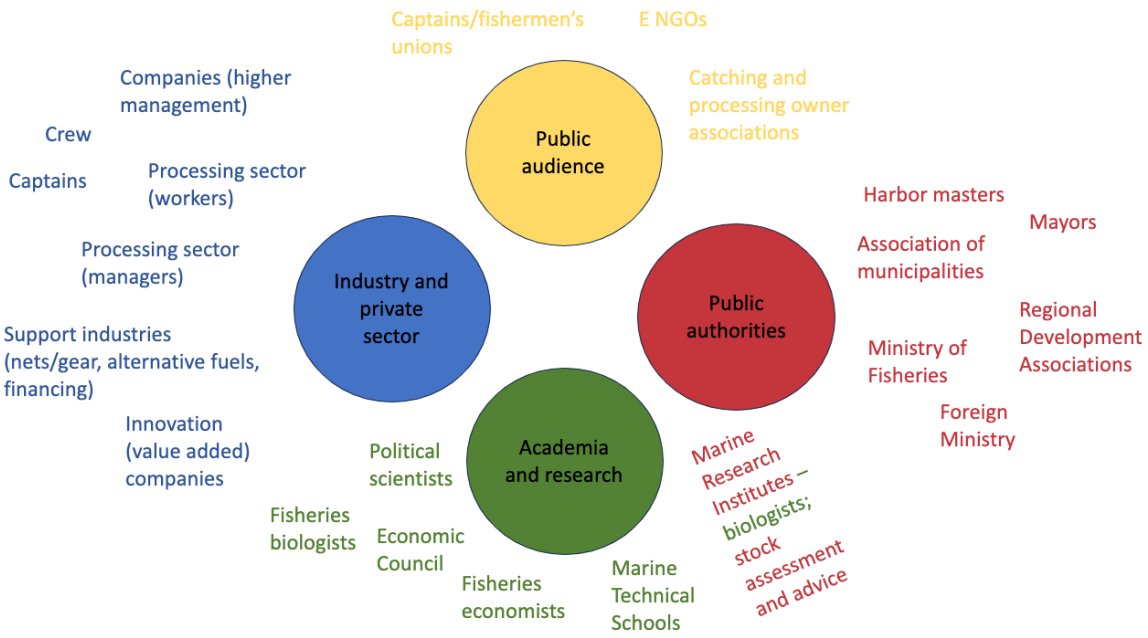



Figure 1: Stakeholder categories for the Arctic DA

## 2.2 Data collection and analysis

The first activities at this stage included the development of informed consent forms and information letters (see Milestone 2.6), an interview protocol (Appendix A), and an initial description of stakeholders to contact. The interview material followed EU GDPR guidelines. These were then translated into the local language of each respective territory, including the

development and translation of the Marine Sabres leaflet in order to reach more stakeholders (see Milestone 2.6)

The interview protocol was designed as a semi-structured interview, taking into consideration the time limitation of relevant stakeholders. The protocol is designed with three parts (Appendix A). The first part was made up of a few open-ended questions that sought to address changes, challenges, and opportunities as seen by each respective stakeholder. This allowed space for communication that revealed the opinions, thoughts, and priorities of stakeholders without any influence from the research team. This also allowed for the identification of conflicting aspects among different categories which will inform the Simple SES. Questions with contrast in time (e.g., 'compared to 10 years ago' or 'over the next 10 years') were used to aid the interviewee in pinpointing current or future interests and issues and to explore how the interviewed views or has responded to recent change. This section was designed to align with the open interview methodology used in the other two MarineSabres demonstration areas, but with more specific questions that would be more appealing to the majority of our stakeholder group.

The second part of the protocol focused on the connection and cooperation across national borders. This section aimed to get an insight into how stakeholders do or do not cooperate with other countries, or institutions in other countries, to understand how the international aspect can feed into the Simple SES to be applied in an international context.

The third part contained a quantitative data collection of 26 elements that are thought to be of importance in any SES model, where elements were ranked from least to most important for the stakeholder in the role as it related to pelagic fisheries (Figure 2). These elements were chosen based on the general expert knowledge of the research team regarding important issues in the pelagic ecosystem for science, management, the fishing industry, and public interest groups. This section was designed to align with the closed surveys used in the other MarineSabres demonstration areas, but with a reduced set of elements that are more specifically applicable to the study system.

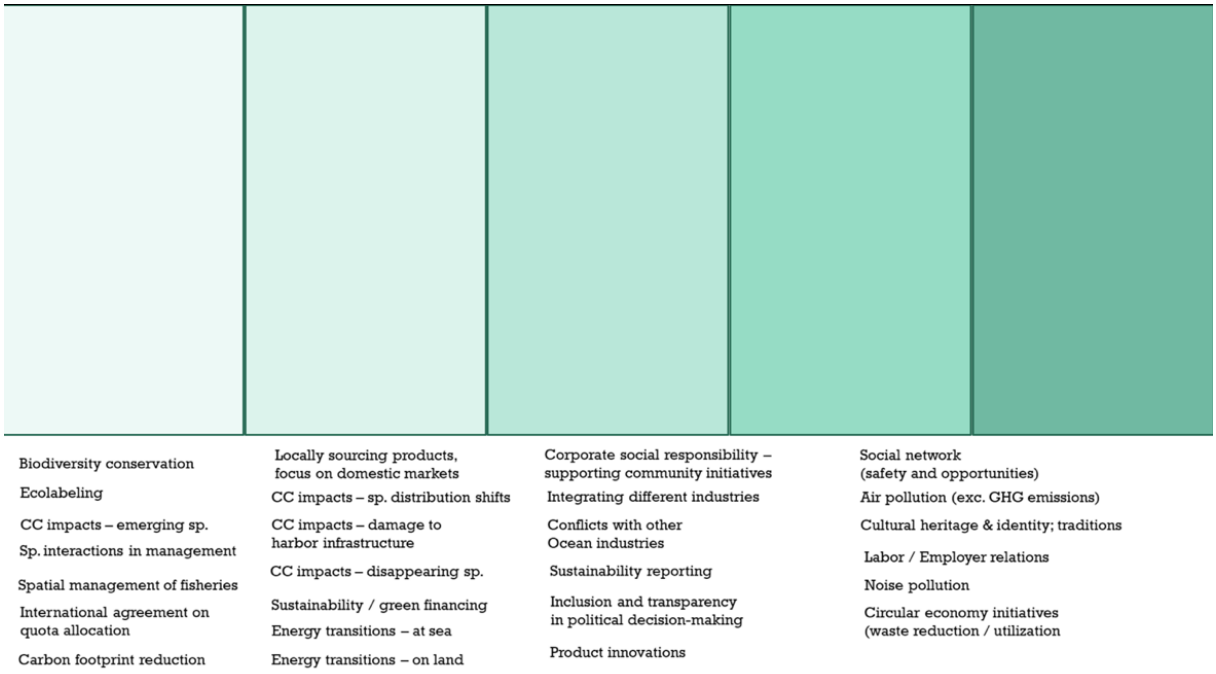



*Figure 2: Stakeholder Interview Likert Tool.*

Interviewees were asked where elements, translated into the local language where needed, should be placed on the interviewer's computer based on a scale of 1 (left, light green, least important) to the right (5, dark green, most important) when considering their importance in the management of the Northeast Atlantic pelagic ecosystem. Not sure or applicable was reflected by not moving the element. Element orders were randomized for each interviewee.

Finally, after the MarineSabres General Meeting in September 2023, it was also agreed upon that in the interviews, we would include a survey designed by WP4 members. The survey was made up of 16 statements, in which respondents were to state whether they strongly disagree, disagree, neutral, agree, or strongly agree with the statement, and a final characterization of the influence level of the interviewee. The data collected in this survey feeds mainly into WP3 and WP4 tasks, in which responses will be used to connect the individuals via a structural analysis of governance. This was included in the stakeholder interviews in order to increase responses.

The Likert data from the interviews was used in R (version 4.2.2) in order to estimate proportions (%) of each Likert category for each topic. The function Likert() from the HH package (Heiberger and Holland, 2022)[1] was then used to plot the results. Qualitative data were analyzed by exploring trends and similarities and differences within each nation. Future analysis will include qualitative coding and comparison between nations.

[1] Heidberger, Holland (2022). Package "HH". Available from: https://cran.r-project.org/web/packages/HH/HH.pdf (Last accessed 30 Nov 2023).

# 3 Preliminary results

Approximately 70% of the planned interviews have been completed. This section provides an insight into the first results obtained from the semi-structured interviews, separated by nation. Due to the delays described earlier, not enough data have been collected in Greenland to give a clear and unbiased view, so we refrain from showing results at this time. Finally, the results from each nation will be combined to identify and discuss differences and similarities in terms of priority components, including main activities, pressures ecosystem components, and societal actors in each system. The last section will seek to directly answer the goals of deliverable 2.1, and will further give an overview of existing tools and guidelines that are being used in the Arctic DA.

Note that there are still a few interviews that need to be conducted, but once all data has been collected, the further analysis process will be conducted and fed into the other work packages in this project.

## 3.1 Faroe Islands

This section will discuss the preliminary results from the Faroe Islands. As the interview was split into three parts, it is useful to discuss the results in three parts, starting with the priorities concerning ecosystem and societal components. This will be followed by a discussion on the qualitative data on changes, challenges, and opportunities, as they relate to the priority components, and finally, the section will discuss connection/cooperation across national borders.

### 3.1.1 Priority components

All stakeholders were asked to rate elements on a scale from 1 to 5, based on how important the element is for the stakeholder and their activities. This was used to identify priorities, both social, economic and ecological, and identify any conflicts between stakeholders' activities.

Overall results can be seen in Figure 6 below.

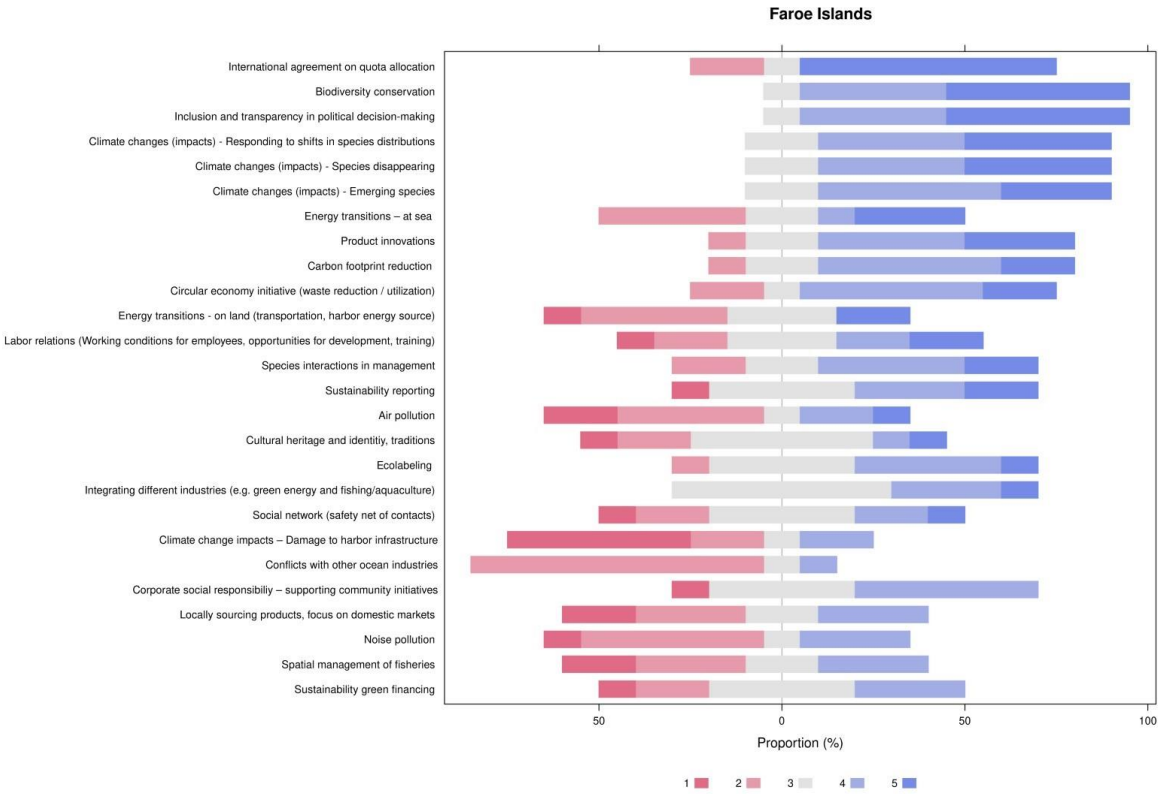



*Figure 6: Likert Scale Results in the Faroe Islands illustrating the variance of importance for each element.*

As Figure 6 illustrates, the elements receiving the highest average scores are biodiversity conservation and inclusion and transparency in political decision-making, making these two a priority among most stakeholders. This is followed by elements concerning climate change impacts on emerging species, disappearing species, and responding to these shifts, as well as international agreement on quota allocation, all of which score an average above 4. Sustainable human activities that attempt to affect the marine environment for the better, such as ecolabelling, carbon footprint reduction, circular economy initiatives, integrating different industries, product innovation, and sustainability reporting, received scores between 3.5 to 3.9, making them not the most pressing priorities, but nevertheless important.

The element with the lowest average score of 2, is climate change's impact on damage to harbour infrastructure. This is arguably, as was also mentioned by a stakeholder, due to how the harbour infrastructure in the Faroe Islands is built and is well-prepared for heavy storms. However, for others, this was ranked fairly high, as such infrastructures are recognized to destroy very important natural environments. Other low scores were for components such as conflicts with other ocean industries, spatial management of fisheries, locally sourced products, cultural heritage, air and noise pollution, sustainability green financing, and energy transition on land, all of which received below an average score between 2.3 to 2.9.

However, the figure also shows the contrast between elements that are scored most important and least important by at least one stakeholder, which says something about the conflicting priorities among stakeholders. The largest differences, those that have received 1 (least important) or 5 (most important) by at least one stakeholder, include cultural heritage, social network, labor relations, air pollution, and, finally, energy transitions on land. Other elements that have 3 points between the min and max score include species interaction in management, spatial management of fisheries, ecolabeling, carbon footprint reduction, circular economy initiatives, locally source products, corporate social responsibility, product innovations, and further elements, indicating disagreement among stakeholder into what effect human sustainable practices have on the marine environment. This will be discussed further in the following sections.

There are several elements where there are differing opinions of priorities, which highlight the complexity of the sector. These perspectives are of course highly influenced by individual perspectives and role in society, industry, and ecology. It is therefore worth comparing the scores as given by each category group, as illustrated in Figure 7.

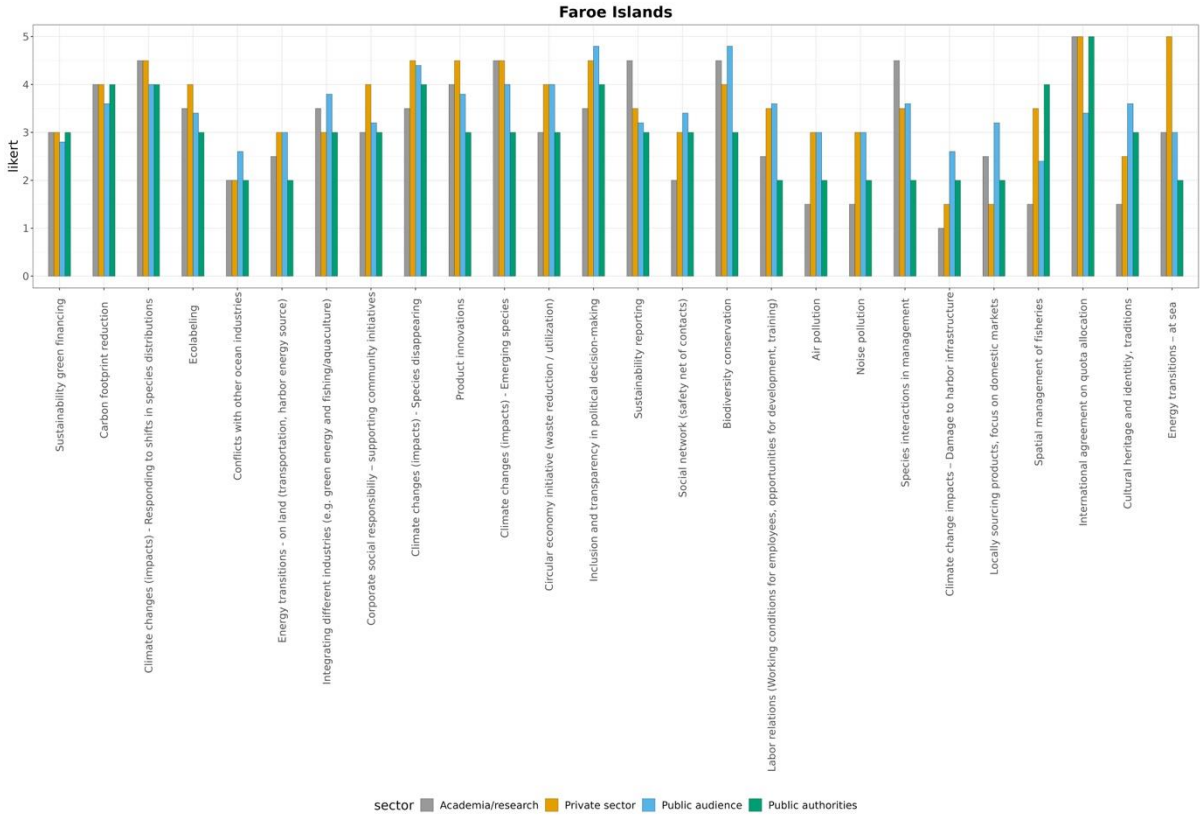



*Figure 7: Average scores per category stakeholder group ordered from most (left) to least agreement (highest variance) among stakeholder groups (right).*

As can be seen in Figure 7, there are certain elements where all agree ought to be a priority, where all score the element above or at average. This includes for instance biodiversity

conservation, responding to shifts, emerging, and disappearing species, international agreements on quota allocation, ecolabelling, and inclusion and transparency in political decision-making. On the other hand, there are also elements where all stakeholders agree (on average) on the lower priority of certain topics. For instance, looking at average scores that are below or at an average for all stakeholder groups includes energy transitions on land, sustainability reporting, damage to harbor infrastructure, noise, and air pollution, and conflicts with other ocean industries. These elements are not deemed to be of high relevance regarding pelagic fish stocks, pelagic activities, and the environment. Lastly, it is worth noting the elements where there are disagreements about how important respective elements are. For instance, spatial management of fisheries and species interactions in management receive both low and high scores among stakeholder groups. In addition, locally sourced products, social networks, cultural heritage, and energy transitions at sea also receive conflicting average scores in differing stakeholder groups.

To further understand the results discussed in this section, the qualitative data set has proved essential. The following section will discuss some of the most common themes brought up in the open-ended questions, that reflect some of the results discussed above.

### 3.1.2 Changes, challenges, and opportunities

As noted earlier, the first part of the interview entailed open-ended questions that sought to get an insight into the changes, challenges, and opportunities regarding the activities of each respective stakeholder. As stakeholders varied from industrial, political, and social actors, the perspectives varied, making it interesting to look at contrasting experiences highlighting the interaction between the ecological, sociological, and economic, as well as the complexity in reaching sustainable solutions. Discussions from this part of the interview also reflect on some of the results that were discussed in the previous section but recall that a complete analysis of the qualitative data has not been completed as the stakeholder engagement process is still ongoing.

When considering the marine environment and accompanying human activities in and around the Faroe Islands, the largest changes observed by stakeholders and beyond are the reduction of demersal fishing and the growth of the pelagic fishing fleet. Specifically, it was noted by stakeholders, that the Faroese demersal fishing fleet is experiencing a significant hard time, having some argue that the fleet is kept afloat by the government through the allocation of mackerel quota, which they can sell on, and is therefore unable to sustain itself. Another change that was brought up by stakeholders is the growing inequality, in terms of wages and income, between fishermen working in different fleets and those involved in the fishery sector on land.

The focus on sustainability in the fishery sector is something that the industry is growing more and more aware of due to requirements being applied by outside actors. For instance, industrial actors acknowledge the importance of maintaining sustainable practices. Furthermore, requirements of sustainable reporting and ecolabeling are essential for their competitiveness. However, some stakeholders belonging to the public audience category did express concerns about demands on sustainable reporting, ecolabeling, etc. as being a rather shallow practice among industries and does not necessarily reflect the actual state of marine environments and the necessary changes in practices.

However, stakeholders from different categories do acknowledge a rather cooperative element in the pelagic sector that is not present in other fishing fleets. Especially reference to the hunting culture in the demersal fleet, where the focus is on fishing as much as you can, was made to express the difference in the pelagic sector, one in which politics and industrial goals go quite hand in hand alongside the sustainable requirements. Societal actors, or some respondents in the public audience group, did express different opinions of the pelagic sector as some directly expressed the importance of sustainable practices to remain competitive, and other stakeholders expressed scepticism toward industrial actors and their sustainability initiatives, claiming that their only intention is profit.

Nevertheless, priorities reflect the main challenges in the pelagic sector. The most important elements of biodiversity conservation, transparency and inclusion, as well as agreement on quota allocation, are associated with challenges concerning overfishing. Stakeholders in Academia and Research noted that stock assessments indicate that herring and blue whiting are fished at 120%, and the mackerel at 140%, although there are uncertainties if the mackerel is overfished. This is mainly caused by the lack of international agreements and is also closely related to biodiversity conservation, which one stakeholder argues ´´we might as well take less now and know what we have, rather than wait for the system to explode´´. This is also supported by industrial stakeholders, who argue that *“There is no doubt that we want an agreement despite the immediate reduction in catches that this would entail. It is very unfortunate that we are fishing so much above the advice. This is not our choice”.* This reflects that the pelagic fleet does wish to follow ICES advice and prefers long-term planning. ICES operates as the overall guidance framework for advice, operating as an umbrella organization for the marine research institutes in each respective country. However, whilst everyone expresses a uniform goal, the challenge remains: ´´… you are there fighting for money, no one wants to give up anything, and this is just the way negotiations go´´. In addition, priorities concerning emerging and disappearing species, and responding to shifts, are related to challenges concerning fluctuations in pelagic fish stocks, which have historically fluctuated a lot, making this an established practice in the industry.

The future of the pelagic sector is viewed as one with great potential if issues of overfishing can be solved; in other words, if international agreements are achieved. The future of international agreements is however more uncertain today than it was in the past. From 2014, international agreements were made between three countries up until 2019. Brexit led to the Faroe Islands losing access to UK waters. This was noted by several stakeholders. Whilst this affects the quality and value of the mackerel, as it is now fished earlier than when it is the most profitable, this does also have ecological consequences, as noted by stakeholders:

> ´´… you are very conscious about having an effective fishing fleet as best you can, and this includes reducing the carbon footprint in the fleet…. Access to British waters means you can fill your ship in two days, instead of sailing around for days in Faroese waters and even in international waters, where you release far more carbon emissions´´.

Furthermore, fish for food is far more environmentally friendly than for aquaculture feed, whereas lack of access to British waters affects how much of the raw material goes to feed rather than food, with one stakeholder stating that:

> ´´… now, the mackerel goes to aquaculture feed, whereas before it went for food. So you need agreements with Britain for access, to get better quality of mackerel, that can be used for food´´

Most importantly, the lack of agreement, which occurred after Brexit, negatively affected the overfishing status. This resulted in increased quota allocation in both the Faroe Islands and Norway:

> ´´… we lost the agreement to mackerel. So, in response, we increased our quota in 2021, and Norwegians did the same, then we did the same as Norwegians, so the quota went from 12.6% to 19.6%´´

This will be discussed further in the next section, as the next section focuses on international relations. But before this, it is worth also noting that, whilst the pelagic fleet is recognized as an important industry in the Faroe Islands, it is mostly due to its economic value. Some stakeholders in Public Audience did note, that whilst the pelagic industry is an economically sustainable industry in the years to come, its contribution to the wider society is rather limited. These actors argued that the value of the demersal fleet is that it created jobs and other societal gains that the Faroese people all could become a part of in more tangible ways. In the pelagic sector, very little societal gain is noticed among the Faroese population. This is not to say that the country is not receiving the financial benefits from the sector, but that it creates fewer jobs, and all products are exported or go to aquaculture feed, meaning that citizens are not directly seeing

the benefits or participating in this sector. This arguably does cause a detachment from the sector by the overall society, which is also feeding into the political conflict on resource allocation on questions about how to distribute the wealth and the ever-growing gap between wages from fisherman to fisherman and beyond.

To wrap up this section, major changes in the fishing industry in the Faroe Islands are marked by the growing pelagic industrial sector and the poor performance of the demersal fleet. From a social perspective, this has led to growing inequality in terms of wages between fishermen, and growing disagreements between industry and society, as certain industrial fisheries are making very large profits with societal actors arguing for better distribution of wealth. This is in contrast argued to harm the competitiveness of companies in the international market. From an ecological perspective, the main issue in the pelagic sector is the overfishing of pelagic species that are due to a lack of agreement across national borders and access to British waters, which has further ecological consequences, including fish for feed and higher carbon emissions.

### 3.1.3 Connection and cooperation across national borders

The second part of the interview, e.g. connection with other countries, allowed stakeholders to discuss their relations with other countries, whereby the interviewer asked respondents to describe their relationship with multiple countries one by one, including Greenland, Iceland, Denmark, Norway, EU, Britain, and Russia. They were also given the opportunity to discuss any country in which the interviewer did not specifically ask about. This was then followed by a scoring exercise, where respondents were asked to score their cooperation with individual countries from 1 to 5, based on how bound they were to each respective country. The results varied depending on the stakeholder category, which was somewhat expected, but even those not directly engaged with pelagic fisheries also cooperate across borders, highlighting the interconnectedness of these countries. The scores can be seen in Figure 8.

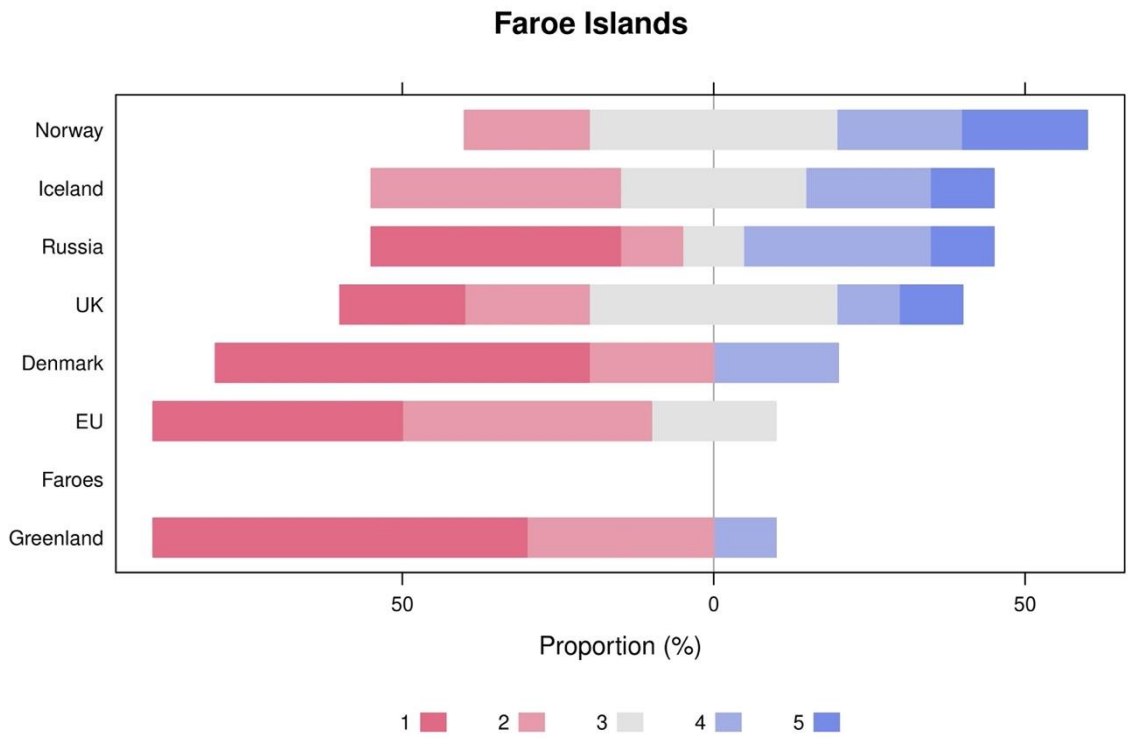



*Figure 8: Importance of international connections with individual countries in the Faroese pelagic sector.*

As Figure 8 shows, the lowest score is of Greenland, 1.6, and the highest is Norway 3.4. To explain these results, it is worth addressing some of the justifications behind the scores that reflect on both ecological, societal and economic dimensions, including historical, cultural, political, and other factors that tie these countries together.

The meaning applied in descriptions of relations with other countries did vary from being a symbolic and historic relation to an economically bound relation. For instance, multiple stakeholders, from different groups, did describe Faroese relations with Greenland in historic ways, as noted below:

> ´´... Faroese people have great opportunities over there and are captains in most ships in the Greenlandic fishing fleet. This probably has something to do with the fact that we are like Greenlanders in some ways [culturally & historically] ...´´.

> ´´... It [the connection] is rather special. We are in a group called DFG (Denmark, Faroe Islands, Greenland) which deals with international areas outside the Exclusive Economic Zone... in these negotiations, we are not an independent party, but we are Faroe Islands-Greenland... however this does not necessarily have meaning in coastal state negotiations... and we probably do not sell or buy from them, and it is rare that a Greenlandic ship lands in the Faroe Islands...´

The strength and importance of Greenland-Faroe relations are bound to economic insignificance, as the scoring of the connection results in the lowest score of 1.6. Hence, the scoring of country relations takes on an industrial and economic lens when considering importance from the perspective of pelagic fisheries. However, there was one stakeholder in the public audience group who did take on an ecological lens, giving Greenlandic-Faroes relations a 4, noting:

> ´´It depends on how you look at it... considering biological consequences, regarding the melting of ice, there is a lot of connection... a 4, as it is meaningful, as an interests point on what happens to life there, and regarding certain dangers, that we can learn from...´´

Another important historical and cultural relation is the Faroes-Iceland relations. The Faroe Islands has a long history with Iceland both regarding pelagic and demersal fisheries. Today, the two countries fish in each other's waters, whereby Iceland can fish 100% of their blue whiting quotas in Faroese waters, and in return, we can fish herring and demersal fish species in Icelandic waters. Regarding the herring, it is beneficial to fish in Icelandic waters, as this is where the herring is more collected and less spread out. This connection is however also historical and cultural, as noted by a stakeholder:

> ´´... Iceland has been amazing for me. I fished there in the ´80s and ´90s, and we have always had good cooperation, and we, Faroese, have always received goodwill from them. The support we got from Iceland in the 80s, was far more valuable than the block [financial support from Denmark]. I would say we are brother nations. ´´

This is interesting, as in the Faroese political landscape, there have been attempts to raise concerns about a specific agreement, called *Hoyvík Sáttmálin*, between the Faroe Islands and Iceland. The political discussions have been that Iceland is receiving more benefits in this agreement, than the Faroes. Yet, this has gained little support from the public and the sector, perhaps due to the ´´brotherly´´ relation highlighted above. This was also directly noted by one stakeholder:

> ´´... the history weighs a lot ... we have a historical collaboration that is hard to measure, you cannot count or use a millimeter Justice parameter, you just don´t do that... we have this *Hoyvík Sáttmálin*, which is very good for Iceland, and most people think it is not a win for us. But we just don´t have anything to sell...´´

Norway received the highest score in terms of Faroese connection, an average score of 3.6. This is both a negative and positive relation, as noted:

> ´´... Norway, we know both good and evil. We have good cooperation, but we also do have conflicts and competition, where we bite each other here and there... the conflicts are quota-related´´.

There is therefore a difference in how we understand the conflict between Faroe-Norway compared to Faroe-Iceland. For instance, one stakeholder notes that:

> ´´... There is a grey zone between Icelandic and Faroes waters, that both parties claimed to own. We have sometimes crossed that line and fished in Icelandic waters. We were therefore asked to move, and so we did. There was never any dispute that came out of this. So, it is like, the ´old´ has value, and you do not make a big deal out of things, that could be a disagreement...´´

Several other interviewers did highlight conflicts and discussions involved in Faroe-Norwegian relations, as they relate to the quota on herring and mackerel. Furthermore, from an industrial perspective, not only do they negotiate on the quotas of pelagic fishing species, but landings and financial services are also from Norway, making them an important partner in industrial investment. From an ecological perspective, the relations with Norway and Iceland are essential, especially in conducting the stock assessments, which seek to protect the sustainability of the pelagic species and build upon the advice on quota.

The conflictual nature of Norwegian-Faroes relations is identified among stakeholders, yet other coastal states, also involved in negotiations of the same pelagic fish species, do not follow the same nature. For instance, regarding Faroese-British relations, there is a mix of experiences among stakeholders that reflect social, economic and ecological dimensions. First, the Faroe Islands have not been able to enter British waters since Brexit. This is rather unfortunate, as this is where the mackerel is most valuable as was noted above. From an ecological perspective, this means that the mackerel is fished too early by Faroes, as noted:

> ´´... regarding the mackerel, there is good understanding of where the mackerel spawns and for how long, and that when it comes North in the summer months, this is when it eats and grows the most. You want to fish him after this stage, but as we are not able to get into British waters, you must fish him earlier... this is first and foremost about money...´´

But this also has consequences for the quota allocation applying pressure on the ecosystem, as also was noted above.

There is therefore a negative link between a lack of agreement with Britain and quota allocation, leading to overfishing. There is also a strong economic interest to get an agreement with Britain, and the industry does express willingness to give up some of their blue whiting quota, to get access to mackerel in British waters. Yet, another interviewer argues that this is rather difficult due to the differences in the value of the pelagic fish species. In addition to this, several stakeholders noted that Norway is allowed to fish in British waters. One reason is that the Faroe Islands have little, or less, to offer Britain. Others argue that we are their enemies in negotiations. However, whilst there is still hope to establish an agreement with Britain, it is expressed that the British industry is not very willing to do so, as noted:

> ´´... we have big expectations. But the [British] industry is not so happy with Faroes and has been after the Faroes, way before they exited the EU. This is in relation to quotas, industry, and I would not say that this is due to anything personal, but only financial interests...´´

This was further confirmed by public authorities, who noted that the agreement was created in Brussels, and this has had consequences and that ´´…in both Scotland and Shetland we have felt that this crossed their boundaries… this is still felt today´´.

Since Brexit, relations with the EU are not considered important, as well as relations with Denmark are given little significance from an industrial pelagic fishery point of view. However, when it comes to ecology and the environment, these two actors are considered important as a source of funding and as a source of vision. As noted:

> ´´... We are not members of the EU, so not a strong connection there... one of the good things in the EU, is that they look ahead and have much larger perspectives. We should have a much stronger relationship with the EU. They did boycott us a few years back, and everyone had to get offended by it. It is a shame, as the EU is the largest entity for peace in newer times, both politically and financially. It is a place where we [Faroe Islands] belong but did not join due to fisheries´´

This highlights the complicated, historic Faroes-EU relations that are highly connected to quota allocation, a disagreement which is between Faroese fishing goals and the EU. This does address the lack of political unity regarding the EU, as whilst some members of the public audience desire a stronger relation with the EU, as noted above, others do not:

> ´´... Someone messaged me from Brussel, to ask if I could be part of a project. But at the time, I was so angry, something was going on. So, I said, no, because the EU is corrupt. EU parliament does a lot of lobbying, where the ultra-liberal powers are very active, most of whom have no idea what is going on. Therefore, I do not expect much of the EU, but one can always hope. ´´

This political landscape is also highly related to the Faroe-Russia relation, which was strengthened heavily during the EU boycott of the Faroe Islands. And since the invasion of Ukraine, the future of relations has received a lot of attention in the Faroe Islands. The results indicate an average score of 2.5, with either receiving very high scores or very low. This cannot be understood and seen separate from the political spectrum, which is fuelling a very heated discussion in the country. So, a high score is influenced by one's political standpoint that one wishes to continue cooperating with Russians, whereas a low score wishes not. This is also highly evident in interviews:

> ´´... we have cooperated with them since the 70s... and then they started purchasing from us, which was a big win for us... Russia has always been on our side concerning the mackerel, and it would be a shame if they were not... Russia is always on our side, and these are things, you have to remember...´´

> ´´... if we lose our access to Russia, it would be a catastrophe. It is stupidity to convince oneself of something else. ´´

> ´´... We still have a good relationship with those [Russians] we know... We do not talk about the war. ´´

Whereas other actors, disclose no importance to Russian relations, noting:

> ´´... I have no interest in cooperating with the Russians, to be frank´´

As well as in the field of collaborative marine research, one stakeholder noted that the cooperation with Russians was complicated before the actual invasion, stating that:

> ´´... we haven´t received any numbers from them since the invasion... but right must be right, they did pull out of a study before the invasion, and that was because they did not get enough ship hours. If that would be different now, is hard to say. ´´

To conclude, there are various social, economic and ecological components that affect Faroese cooperation across borders. In the field of the pelagic sector, historical, economic and social elements have had a large impact on today's negotiations, which need to be resolved to reduce the ecological pressures caused by pelagic fisheries.

## 3.2 Iceland

This section will discuss the preliminary results from Iceland. As the interview was split into three parts, it is useful to discuss the results in three parts, starting with the priorities concerning ecosystem and societal components. This will be followed by a discussion on the qualitative data on changes, challenges, and opportunities, as they relate to the priority components, and finally, the section will discuss connection/cooperation across national borders.

### 3.2.1 Priority components

All stakeholders were asked to rate elements on a scale from 1 to 5, based on how important the element is for the stakeholder and their activities. This was used to identify priorities, both social and ecological, and identify any conflicts between stakeholders' activities. Overall results can be seen in Figure 9 below.

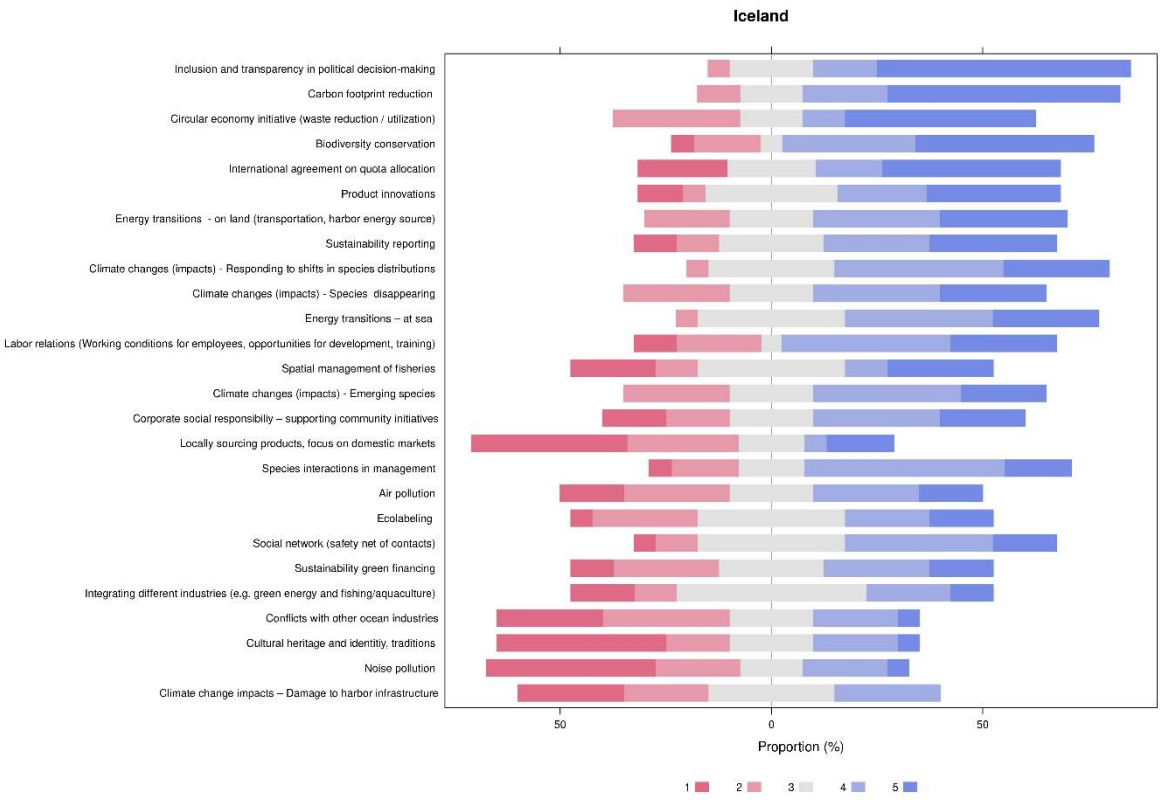



*Figure 9: Average score of Likert scale elements in Iceland illustrating the variance of importance for each element.*

The elements receiving the highest importance (mostly 4 or 5) scoring are inclusion and transparency in political decision-making, carbon footprint reduction, international agreement

on quota allocation and biodiversity conservation, making these a priority for nearly all stakeholders. This is followed by elements concerning climate change impacts on emerging species, disappearing species, and responding to these shifts, as well as energy transitions at sea, all of which scored an average above 4. Sustainable human activities that attempt to affect the marine environment for the better, such as ecolabelling, circular economy initiatives, integrating different industries, product innovation, and sustainability reporting, had a greater variance in importance scoring between stakeholders, making them not the most pressing priorities, but nevertheless important.

The elements with the lowest importance scoring were climate change impacts on damage to harbor infrastructure, conflicts with other ocean industries, cultural heritage and identity and noise pollution. The element with the lowest average score of 2, is climate change's impact on damage to harbour infrastructure. This is arguable, as was also mentioned by a stakeholder, due to how the harbor infrastructure in Iceland is built and is well-prepared for heavy storms. However, for others, this was ranked fairly high (3 or 4), as such infrastructures are recognized to destroy very important natural environments. Other low scores were of components such as spatial management of fisheries, locally sourcing products, air pollution, sustainability green financing, and energy transition on land, all of which received a score below average, between 2.3 to 2.9.

There are several elements where the contrast between the most important and least important is high, indicating disagreements of priorities from stakeholder to stakeholder. The largest differences, those that have received 1 (least important) or 5 (most important) by differing stakeholders, include for example sustainability reporting, product innovations, spatial management of fisheries, corporate social responsibility, air pollution, and locally sourcing products.

Other elements that have high divergence, that is 3 points between the min and max score, include ecolabeling, carbon footprint reduction, circular economy initiatives, and further elements, which indicate that there is disagreement among stakeholder into what effect human activities have on the marine environment or should involve themselves in the industry. This will be discussed in more detail in the following section.

There are therefore several elements where there are differing opinions of priorities, which highlight the complexity of the sector. These perspectives are of course highly influenced by one´s standpoint and role in society, industry, and ecology. It is therefore worth comparing the scores as given by each category group, as illustrated in Figure 10.

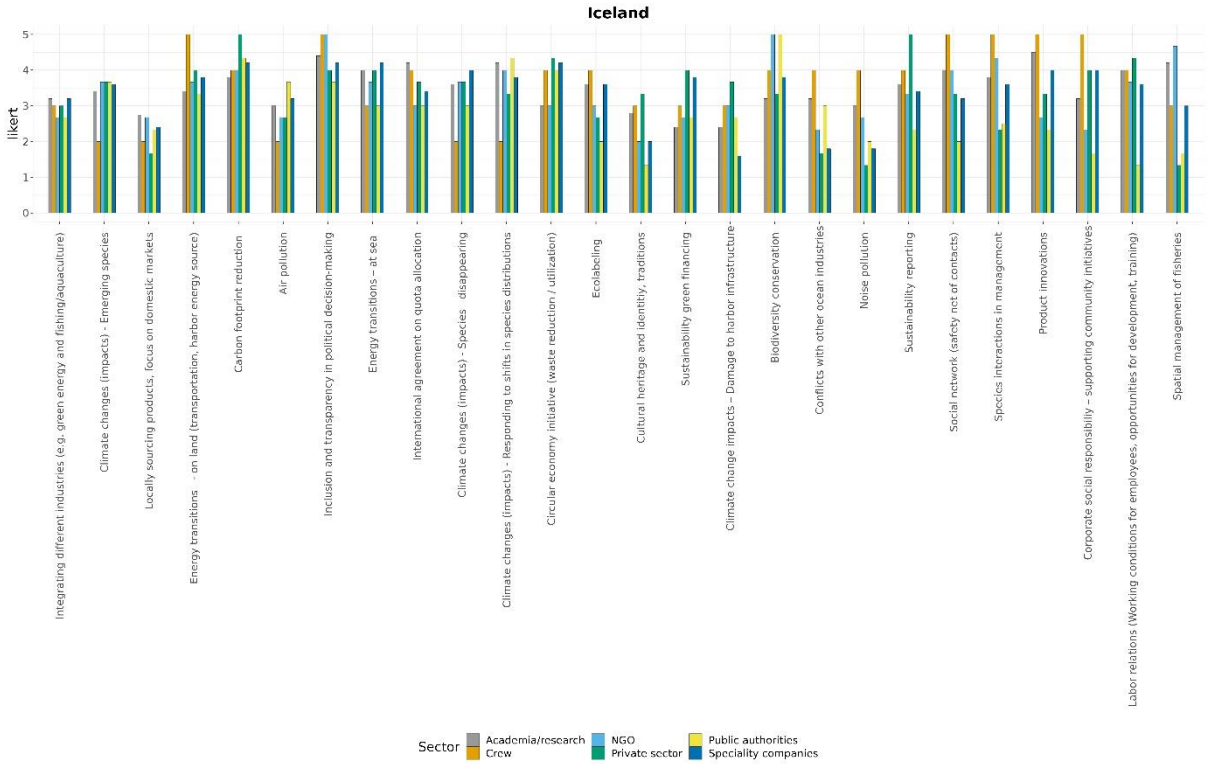



*Figure 10: Average scores per category stakeholder group ordered from most (left) to least agreement (highest variance) among stakeholder groups (right).*

As can be seen in Figure 10, there are certain elements where all agree this ought to be a priority, where all score the element above or at average. This includes for instance biodiversity conservation, responding to shifts, emerging, and disappearing species, and inclusion and transparency in political decision-making. On the other hand, there are also elements where all stakeholders are in agreement that this ought not to be a priority. For instance, this includes damage to harbor infrastructure, noise and air pollution, cultural heritage, and conflicts with other ocean industries. These elements are not deemed to be of great relevance regarding pelagic fish stocks, pelagic activities, and the environment. Lastly, it is worth noting the elements where there are disagreements about how important respective elements are. For instance, spatial management of fisheries, circular economy, corporate social responsibility, and product innovations receive both low and high scores among stakeholder groups.

To further understand the results discussed in this section, the qualitative data set has proved crucial. The following section will discuss some of the most common themes brought up in the open-ended questions, that reflect some of the results discussed here.

### 3.2.2 Changes, challenges, and opportunities

In this section, notable topics that surfaced during the open section are discussed, but it should be noted that interviews in Iceland are only 50% completed, with a rather low representation (compared to the planned total, Table 2) of stakeholders from the “Public Authorities” and “Industry and Private Sector” components. It should also be noted that despite a similar heavy economic dependency on fishing as in the Faroe Islands, Iceland has 8x the population size and a broader diversity of industries that compose its economy. Therefore, the “Industry and Private Sector" not only includes representatives of the fishing industry, but also export, design and engineering, and product development companies that benefit from the value generated by fisheries. Similarly, many of the interviewees within the ‘Academia & Research’ category could also have been counted under ‘Industry and Private Sector’ because of research collaborations or dual affiliations between research institutes and companies. The stakeholder pool in Iceland is therefore slightly larger than in the Faroe Islands, and substantially larger than in Greenland, where few companies perform limited pelagic fishing independently from Icelandic and Faroese operations.

In reference to changes and challenges compared 10 years ago, several of the interviewees from independently brought up the ideas that sustainability is mainstream needs to be taken seriously if the reputation of companies is to be upheld. “I think the challenges are the same [as compared to 10 years ago]… getting the people on board that have been working the same way in 20-30 years prior, and adapting to new challenges in this regard, because they’ve been viewing this as a cute extra thing to do, but it’s not that anymore.”

Most ‘Industry and Private Sector’ respondents pointed toward a general increased awareness of sustainability issues, not only related to fishing activities themselves (e.g. preventing overfishing and reducing bycatch or habitat destruction), but also in relation to a reduction in greenhouse gas emissions and pollution. This awareness seems to be coming from a variety of angles. Two Industry & Private Sector respondents cited increased environmental regulation in Iceland (“Umhverfisstefnan”), one of which also cited greater EU regulation that translates into a need to comply with EES regulations. Respondents also noted an increased demand of buyers not only for certified products, but also in more environmentally friendly transport and packaging preferences. Compliance with increased regulation, certification schemes and standards, and a drive toward remaining on the upper competitive edge when it comes potential future certification schemes (e.g., related to carbon emissions), have driven a greater need for monitoring and reporting, leading the creation of management-level sustainability officer positions in larger companies over the past 5 years.

Another driver of increased sustainability awareness is the continuous development of more “win-win” solutions, whereby the industry can be achieve greater sustainability while increasing revenues or decreasing costs. These come in the form of a greater importance

placed on investing circular economy initiatives, which such as waste or pollution reduction through greater utilization of side streams (also cost-recovery), , increase value of products (higher revenues and more markets), or reduce carbon emissions (also cost-recovery):

> "…the industry is giving more attention to pelagic species to get more value out of it, but also I mean it's more sustainable… right now everything is going to feed when it could be going to human consumption…. They are serious in changing the ways [as judged by recent investments]."

> "I'd say that …the vast majority of the projects … was something regarding process adjustments and instrumentations that would reduce or utilize energy in a better way…. And also we should not forget about the revolutionary technological development that has happened in Iceland in the pelagic industry that fish meal factories, most of them ….are capable of operating fully on electricity… and the company has not been rewarded enough for that technical development I think, just world-wide revolutionary…"

Respondents acknowledged that this increased awareness within the industry is most likely profit-driven as the result of market forces and competition. Companies "...wouldn't invest unless it saves them money,"

> "If it aligns [with sustainability initiatives] then this is great, but due to our right-wing politics in Iceland, I would assume it is driven by money."

However, the increased availability in technological solutions on the market for large companies to buy or invest in has been cited as another driving force of this corporate awareness. As a result, this increase in awareness has been a large driver leading to cooperation of the fishing industry to support research and development, invest in new equipment or services (e.g., transport) to reduce environmental impacts, or even develop their own monitoring or recycling programs. Furthermore, as more environmentally friendly technology becomes available and is used more widely, there is the potential for this technology to become a standard for competition in the industry, and even eventually be incorporated into law:

> "I think the EU should, at least they could, focus on [policy] saying that you [must] have the best technology, which is to use electricity to dry fish instead of burning heavy fuel, rather than you know all those small boilers burning boiler fuel….from an environmental perspective, they are not performing as well as you know the fully developed gas-, electric-generation, or such things…. Local burning of fuel oil should I think not be allowed because we have another alternative."

Interestingly, changes referred to by interviewees in the 'Public Audience' group expressed a similar trend in increased awareness, but this awareness was reflected as a change in the public or consumer. Two of the "Public audience" respondents expressed that a broader increased sense of value in the ecosystem after living in Europe, while a third discussed using European and North American examples of ecosystem-based management approaches as an example to transfer locally. International agreements were mentioned by all three, while some also mentioned domestic biodiversity conservation initiatives ("Auðlindin okkar").

> "We are so proud of all of our fishing, and it's a big part of our identity, but still we have basically no marine protected areas… that made me very angry… I was very surprised about how little effort is in ecosystem-based knowledge, like it is all about fishing and the stocks that we utilize, and not so much about other things within in the ocean. So I think that is something that needs to change."

The changes I have notices are the global biodiversity framework and implications that will have for those are using it…I've seen more general awareness among public just if I go one year back versus now, even more ten years back... The fact that 'Auðlindin okkur' is happening and all the people have different opinions about how effective it will be…"

Several of these respondents also suggested skepticism toward corporate motivations, and a criticism that many current corporate sustainability initiatives are simply 'greenwashing', ineffective, or conducted in a manner that does not allow for third party verification, inviting potential deception or corruption.

> "Right now I feel like it's a lot of greenwashing, we are going to take this mountain and grind it down and move it in the name of it being a greater way of making concrete in Europe and we are going to keep all these aluminum smelters here because we are using green energy within them so it's better than doing it in China …and that's the green evolution, and I think that's a lie."

Several respondents also linked climate change adaptation and mitigation as important themes in their responses, either by citing likely shifts in stock distribution, pressing a link between climate change and biodiversity loss, or acknowledging carbon footprint reduction
as a common corporate sustainability initiative, especially in Iceland which relies on mostly green energy. Several correspondents also noted a potential for 'greenwashing' in these initiatives as well, with a distrust of carbon credit schemes or questioning motivations of companies:

> "Of course, the fishing factories could probably have all the electrical energy they want, if they were ready to pay for it…. Of course, they benefit from buying curtailable load…

> because that's the cheapest energy on the market, and then say ok we cannot use electricity because there is no curtailable load, there is no reserve in the system. But if they had fixed contracts… to buy priority energy, they would not be paying the same price...they don't want that, because electricity is supposed to be cheap in Iceland. We are Icelanders, electricity is cheap...they of course argue that we need more power plants and more generation… so we can buy cheap energy."

In several stakeholder categories, power relationships between the industry and the public, or in politics, often came up as an issue of concern and another potential form of corruption:

> "I don't know if 'colonialism' is as applicable in Iceland because we don't have indigenous land, but it is aluminium smelters from the USA, it is wind farm companies from Norway, it is the fish farm companies from Norway that are using the vulnerability of towns in rural areas in Iceland in their advantage, which is also colonialism, even if though its not on the same scale as using indigenous lands – a neocolonialism mindset that is coming into Iceland."

> "[Ownership of assets] would not … change the outcome of industry if we take for granted that the stocks are, it just depends on who is getting profits out of system and that is more of a political answer. It actually surprises me how calm Icelanders are toward this – it really surprises me…. you see there are financial statements."

Another respondent described how the current state of pelagic fisheries in Iceland reflects the "…pinnacle of development theoretically of a quota system…with all its maximized economic benefits and social perils …It is essentially as consolidated as possible [given laws in place], into five main companies all vertically integrated, all very profitable, that rely heavily on technology…with no role for small-scale fishers." This observation was not communicated as if this consolidation was unwanted, but rather, a necessary consequence of the transition to a quota system with some inherent dangers. It was noted that this situation strongly contrasts with the demersal fleets, which is not as consolidated, and has had the total quota allotted to them "chipped away" over the years by social initiatives (e.g., greater distribution to rural municipalities and small-scale fisheries). The same respondent suggested that the only way for such companies to expand, due to its maximized consolidation, is through a "…focus on quality… or exporting the Icelandic business model abroad"(9BSS3), and that this globalization along with consolidation of power can lead, and has led in some cases, to issues of reduced transparency and increased corruption (e.g., through money laundering, tax evasion, or bribery). Unlike the consolidation itself, these issues were viewed as highly unnecessary, unwanted immoral or illegal practices, and especially deplorable because they are fundamentally derived from use of a public good, thereby translating into a personal affront to the respondent and all other Icelanders who own the resources. "I don't mind if they fish it,

that adds value to society. What I want to know is what they are doing with that money." That is, money that was illegally funnelled to benefit only a few wealthy, greedy individuals, represents a loss to Icelandic society, as that money could have been used to benefit its owners, the Icelandic society as a whole.

Issues related to quota ownership were not limited to the domestic case in interviews as well. As this interview was related to the pelagic ecosystem, there was also a natural focus on changes related to international quota allocation. Interviewees under the 'Academia & Research' and 'Public Authorities' categories spoke about the necessity of delegates to come to agreement internationally to curb overfishing rates that exceed scientific advice: "They need to do their job to agree…. That should be their job and of course and come up with agreements regarding how they want to manage these stocks." However, the complexity of doing so in an international context was very clear through discussion of difficulty in attempting to transfer ecosystem-based fisheries management models from domestic cases to international cases, as well as through discussion regarding historical reasons for distrust (e.g., "bad blood" and past agreements made in "bad faith") and how unilateral tactics have been used even in the past decade to strengthen individual nations' positions in the negotiation process. Interviewees in both these categories suggested that negotiations have not been as urgent until recently due to increasing or stable stock sizes despite heavy fishing. However, this trend appears to be changing for mackerel and herring specifically, adding a greater urgency to achieve an agreement soon, blue whiting remains abundant.

Overall, "International agreement on quota allocation" scored highly in Likert scales (Section 4.2.1), with interviewees in the "Industry and Private sector" expressing similar views in concern over sustainability of the resources as those under "Public authorities" and "Academia & Research." Interestingly, the "Public audience" scored this issue slightly lower, and instead expressed a stronger emphasis on biodiversity conservation. Combining perspectives across all categories, it appears that the explanation lies in differences in perspectives and tolerances for uncertainty. The belief was expressed a few different ways that to perform ecosystem-based management, management should act even more precautiously than is currently done, even in the context of having less scientific knowledge in hand. Some respondents found this to be an acceptable practice, others did not, and yet others simply list it as a challenge to be dealt with:

> "…this pressure for reference points [that steer fisheries management] to be based on something else [i.e., more precautionary ecosystem-based reference point] won't work unless ICES says something."

> "I think you also have a challenge in terms of institutional knowledge and institutional habits, I think our instinct is to be very… clear black and white messages...[in the past]

> it was all 'follow the science'… with ecosystem-based fisheries management, it's a lot more nebulous sort of what a good outcome looks like..."
>
> "The challenge that I am mostly looking at now is how we are going to protect the sea. We talk as if 30% is a lot but it leaves out 70% not protected, and science was advising it to be the other way around, 70% protectoin, which I think makes sense because when I think of sustainability, I should maybe be a 50% -50%,protection and 50% use, but we have been in an overexploitation [state], maybe not in Iceland because we have the quota system, but we have at least been treating the sea not so nicely the last years, so we owe it something, so I understand they would raise it up to 70, but then it was negotiated down to 30 on the premise that 'at least 30' in front of it. So I think that is a problem in the narrative here now, that I think people and ministers have gotten the point that we have to do 30, but the narrative is that it's a lot, because it's a lot from where we are standing now…. But it is at least 30, nobody is saying we can't protect more… I think we should go ahead and protect 30 and not be so cautious about what it is because we need 30 anyway, and then when we continue to find areas that we need to protect, then we add those, and then we are above 30 and that is just good."

Two respondents noted that political climate largely controls whether conservation actions and regulations beyond standard fisheries management are likely to come to fruition. Furthermore, other "Public audience" respondents suggested that the idea that conservation goes against economic interests is fundamentally incorrect, and that the concept of a sustainable economy needs to emphasize a true decrease in environmental impact, rather than an increase in counteractive mitigation measures such as obtaining carbon credits, as well as de-emphasize growth. For example:

> "How conservation of nature and mitigating climate change is very often portrayed as opposite things. It didn't used be like that 10 years ago…People have adopted that climate change is an urgent matter, but their solution is still to keep destroying a lot of nature in the name of climate change mitigation…and then we are also going to double our energy production for climate, so we are always trying to contain a lot of consumerism in this GDP economic growth evolution, but we are going to make it carbon neutral, which no one even knows what it means…"

And in references to opportunities:

> "Reconstructing the quota system and implementing protected areas simultaneously, and also just really make sure it won't be fishermen are getting upset because we are telling them they can't do something, but get them to understand that they are the stewards of the sea and they are the ones who will be protecting it and they are the ones that benefit from us protecting it."

This “opportunity” for conservation viewed by the “Public audience” is viewed by some of the respondents in “Industry and private sector” as one of the greatest “challenges,” indicating opposing perspectives. For example, although allocation of quota did not come up directly in interviews with most "Industry and private sector" respondents so far, it can be expected that forced changes in quota ownership are not looked upon favorably by those who own quota. In reference to this stakeholder group, it was instead suggested that currently there is a lack of communication between government and industry was viewed as needing improvement: “There are rules about this in Europe that the industry has to be involved… Because the companies can’t lose their livelihood. It’s difficult if you have been fishing in a specific area then you know it like the back of your hand… and then somebody says to you, sorry you are not allowed to go there, then the knowledge of fishing there for the past 30 years is lost, and then you have to find a new area, and you don’t know that new area, then it could be more expensive, and you have to go further out, and that raises the carbon footprint… I mean don’t they care about that? … So there are loads and loads of questions related to this 30x30.”

In conclusions, much of the discussion in interviews that was related to utilization of pelagic stocks and ecosystem-based management shifted between topics of innovation related to circular economy initiatives (i.e., greater utilization of resources, reducing waste, recycling), reducing carbon emissions, the need for international agreements to curb current overfishing rates, a greater need for biodiversity conservation and greater tolerance for precaution to be taken in management of uncertainty. Some interesting connections were also brought up between the pelagic industry and aquaculture and energy industries. Sevel topics emerged as well, such as a greater need for communication between management and stakeholders and a need for greater transparency by government, different perspectives regarding fairness and who benefits or does not benefit from greater biodiversity conservation, ethical questions regarding quota distribution and ownership, and skepticism regarding the transparency of corporate sustainability initiatives as well as financial transparency to prevent unethical practices and a fair distribution of benefits generated from resources back to society.

### 3.2.3 Connection across borders

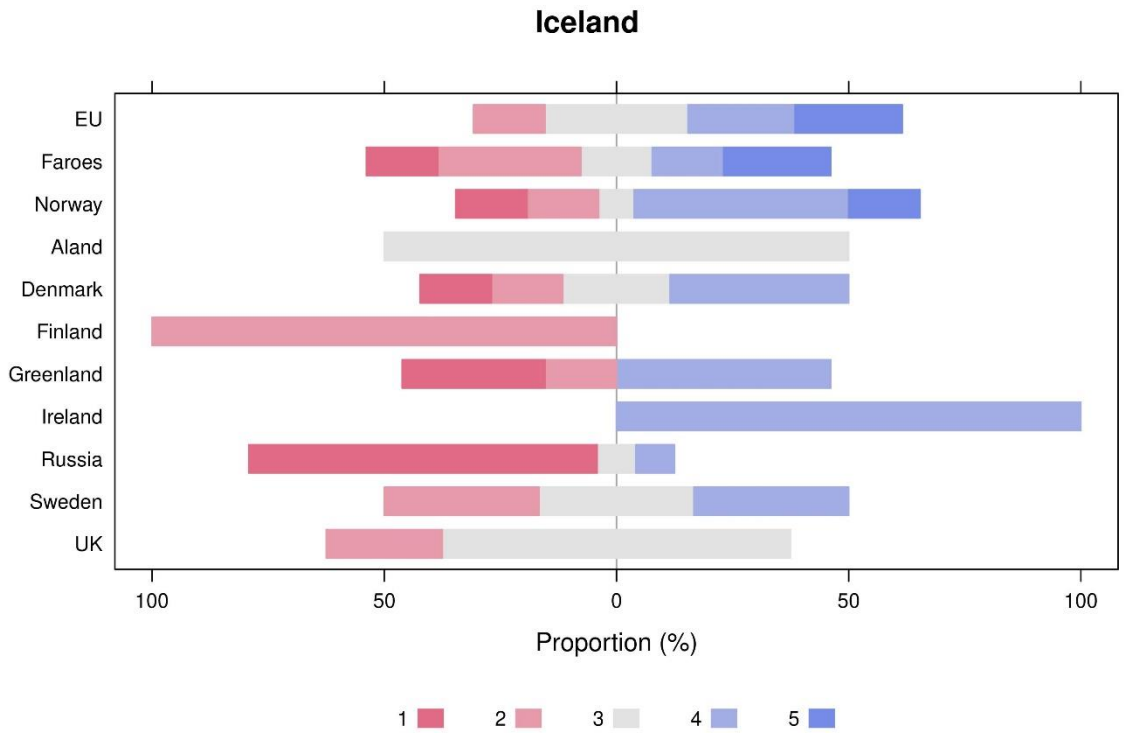



*Figure 11: Importance of international cooperation with individual countries in the Icelandic pelagic sector.*

As in open questions, responses to questions regarding connectivity elicited a diverse array of connections among interviewees that were most often highly related to the interviewee's field of interests or livelihoods. Likert scale ratings across these diverse responses led to relatively high ratings for Norway and the EU, and the lowest rating with Russia (Figure 11). In almost all cases, the low ratings with Russia were not personal or given with a negative connotation but were simply an assessment that there is currently limited interaction with Russia in terms of business, science, and management processes as a result of the conflict in the Ukraine.

The high rating given to Norway and the EU were given for several reasons. Interviewees cited Norway as a source of inspiration for management and regulations and economic growth:

> "We look at Norway like a role model in the aquaculture because they are the really really big brother… and with regards the fishing management… we are constantly reading to see how Norway is dealing with this and that in the rules and regulations …the way that the environmental ministry is doing things."

Norway was also considered a market for businesses selling equipment or designs in technology and innovation fields, a collaborator for science, research, and development who is "really good at their stuff", and a partner in advocacy group networks where environmental

concerns are similar. It was also noted that many of these connections and collaborations, as well as similar connections and collaborations with other Nordic nations, are facilitated by formal avenues of Nordic collaboration, such as funding available from the Nordic Council of Ministers.

However, as was the case when considering Faroese – Norwegian connections, the Icelandic – Norwegian relationship was complicated with both positive and negative connotations. It was also recognized by several interviewees that Norway has not been a supporter of Iceland in international agreements, as Iceland is "fighting the most about quota" with Norway (11BIS17). In addition, despite its positions as an economic role model to some, it perceived by others to be a role model in the promotion of business over environmental protection:

> "When I think of Norway I think of aquaculture and deep-sea-bed mining. So sometimes Norway is being put up as a good role model in that they are so good but they are the worst [environmentally]… also oil drilling."

Even more directly, it was mentioned as a colonial entity to Iceland, as previously quoted in Section 4.2.2 ("…it is wind farm companies from Norway…"), as well as containing business entities that outsourcing operations to Iceland to increase environmental carrying capacity available for production and/or degradation:

> "Iceland has a strong connection to Norway through aquaculture – fees are cheaper in Iceland so Norway is expanding to use the Icelandic environment…"

Connections with the EU were less complex as they were mostly neutral or positive, but still strong. Denmark was often grouped with the EU in this respect despite the special treatment we gave it here due to its current political relationship to Greenland and the Faroe Islands and its recent colonial history with Iceland. Responses for the UK were also similar to these, despite Brexit. The EU, Denmark, and the UK were mentioned as an important market for pelagic products, as well as equipment to some extent, by stakeholders from "Industry and the private sector" and a source of good political relations both by "Public audience" and "Public authority" interviewees. The EU was also mentioned as a source of funding and manpower for collaborations. "Industry and the private sector" also mentioned the EU as both an indirect and direct source of policy influence, as demonstrated by the earlier reference to EU policy and the recent need to take into account sustainability reporting required under the EES, both also mentioned in open questions (Section 4.2.3).

Greenland and the Faroe Islands were both rated with intermediate connectivity to Iceland, with Greenland being less connected overall. The Faroe Islands was listed as a role model in terms of aquaculture and its link with fish meal production:

> "We read a lot and look at them and the aquaculture companies often as a role model in how the salmon aquaculture industry is done in the Faroe Islands and we would like to be more like them because how they do things is very efficient."

It was also listed as a market in selling technology, design, and equipment to the Faroese industry and a collaborator in science and researcher, but respondents considered there to be fewer ongoing collaborations than there could be, for example when compared to Norway and the EU. In addition, although it was viewed that there are good bilateral agreements and generally good national connections, almost to the extent of a kind of brotherhood, between the two countries and societies, this relationship breaks down when placed into the multi-actor international arena of international quota allocation negotiations. It was viewed that the Faroese were not supportive of Icelandic negotiations, and that business and political relations with the Faroes are strained due to the Faroese support of Russian relations when Iceland partakes in Russian sanctions due to the conflict in the Ukraine.

Despite this strain, interviewees in all categories expressed a wish for better relations with or connections to the Faroes and Russia. The same was expressed for Greenland, except in the cases of shared fisheries, fishing ground, fisheries science, and management, where collaboration levels were deemed high and bilateral agreements and political relations are generally good. Formal business connections were also mentioned as Icelandic investment in Greenlandic companies, which was seen as strengthening in terms of diversity from Icelandic side and strengthening in terms of economic development and cooperation in Greenland. The Greenlandic government continues to work to make fisheries research and company collaboration grow between Greenland and Iceland. It was also indicated in several cases that more sharing of stocks is expected to be needed in the future, although this was not reflected in Likert scale ratings, which focused on the present.

In conclusion, across-border connections show modern cultural and policy influences from especially Europe and Norway, and Norway and the Faroe Islands are often looked toward as a role model in innovation and positively culturally, almost as "brother" nations in the Northeast Atlantic. However, there is also space for improvement among Norway, Iceland, the Faroe Islands, and Greenland, due to past or potential conflicts regarding shared waters not only with each other but also Europe, and the past geopolitical dynamics that have shaped today's relations.

# 4 Priority components

This deliverable is intended to provide insights into two key pieces of information that will feed into next steps in WPs 3 and 4. Specifically, although the priority components for each territory may vary (and results are not final), there are some general trends. Here we use results to ground truth the scope of the simple social ecological system that will be developed in later work packages.

## 4.1 Scope

Here we summarise results by activities, pressures, ecosystem components, and societal actors involved, corresponding with categories analysed in other DAs using the closed survey in WP2. Results can be compared with and used to augment the preliminary DPSIR analyses performed with only project members involved.

**Activities:** The main activities brought up were fishing, and in only a few cases, cargo. The only conflicts between ocean industries suggested, when discussing the element in the closed survey, were future conflicts with potential offshore mining or offshore wind industries. Potential societal conflicts between demersal and pelagic fleets were suggested, but these are related to domestic allocation of fishing resources and wealth inequalities, rather than trade-offs in resource use within the ecosystem. Ecosystem trade-offs were interestingly more closely related to activities on land, e.g., in the use of energy for fish meal production or in the usage of pelagic products for fish meal used to feed salmon aquaculture versus human consumption.

**Pressures:** Effects of climate change was a theme that came up in all stakeholder groups, especially in relation to potential shifts in species distributions, or changes in productivity, or degradation of biodiversity. Interestingly, climate change, or more general environmental fluctuation, affected not only business operations, but the political negotiation process rather directly, due to a common dependency of argumentation to be based upon fishing history. The needs for fulfilling contracts with international markets and staying on the upper competitive edge with regards to current and future certifications, innovation and growth were also important. Reporting requirements, which are implemented domestically or according to EES regulations but driven by international trends, especially in EU regulations and standards, were also mentioned. Greater public interest in conservation of biodiversity and increased transparency in corporate finances and sustainability claims were also apparent. Finally, both historical and recent geopolitical changes and alliances (e.g., due to several different forms of sanctions, Brexit, and the conflict in the Ukraine), pose continuous challenges in science, business, national economies, and international negotiations.

**Ecosystem components:** The main ecosystem components that were mentioned as important included the commercial species themselves and more generally, biodiversity. Zooplankton

were mentioned by one respondent as being fished by nations outside the Arctic DA. Shrimp were mentioned as being fished, but not within pelagic areas. Whales and birds were mentioned as important components of the ecosystem in a general sense that they are large animals that exist in the pelagic ecosystem with high human non-commercial value (I.e., they are protected). In another case, when prompted about the importance of whales, a respondent suggested that they are thought of as a source of predation on all pelagic stocks, but fishing is only thought to negatively affect them directly via competition with the capelin fishery or rarely as bycatch.

**Societal Actors:** The societal actors to involve in this study did not change substantially from those determined in Milestone 2.6. Referrals to include additional respondents were received, but most were referrals to the same type of stakeholder as the interviewee itself, rather than adding diversity to the stakeholder pool. Therefore, these referrals will be kept for invitations to further rounds of interviews or stakeholder workshops planned at later stages.

## 4.2 Priority elements

From the scaling of elements conducted in interviews (Sections 4.1.1 and 4.1.2), some elements scored highly in both the Faroe Islands and Iceland. An aggregate plot of the Likert elements from the Faroes and Iceland (Figure 12) shows that there is a variation in responses but overall, biodiversity conservation, shifts in species distributions or emerging and disappearing species due to climate change, and inclusion and transparency in political decision-making are important elements. Icelandic had a higher emphasis on carbon footprint reduction, likely as a result of the availability of cheap green energy. In both locations, sustainable human activities that attempt to affect the marine environment for the better, such as ecolabelling, energy transitions, circular economy initiatives, integrating different industries, product innovation, and sustainability reporting, had a greater variance in importance scoring between stakeholders. These are therefore not the most pressing priorities, but nevertheless important to keep in mind. Priority components in Greenland will be determined by interviews conducted in December. With this information in hand, guidelines created by WP3 members will be followed to conduct a systems analysis of the Arctic DA, as a component of WP4 deliverables. The plan at this stage is to conduct these systems analyses using causal loop diagrams within nations, and then join them thereafter. Further rounds of stakeholder interviews and/or workshops will then be needed in the appraisal process of presenting results, validating the analysis through stakeholder feedback, and co-creating solutions to perceived priority issues.

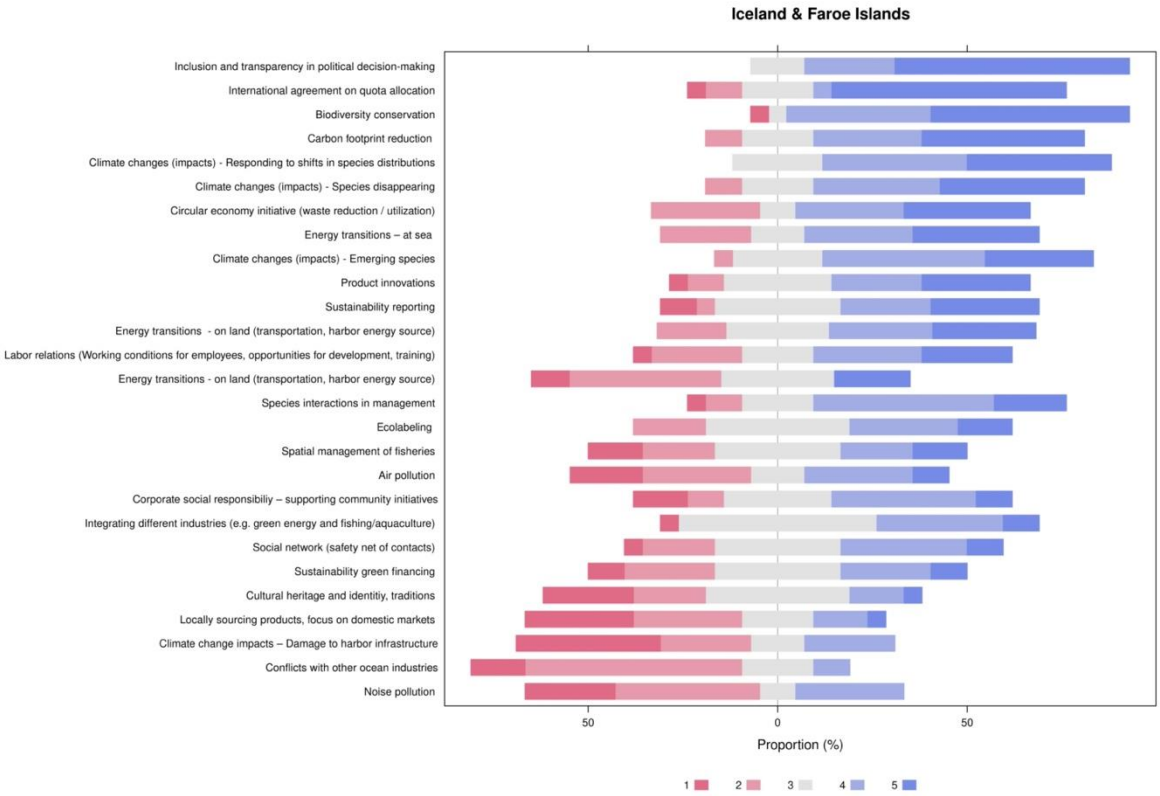



Figure 12: *Average score of Likert scale elements in Iceland and Faroes illustrating the variance of importance for each element.*

## 4.3 Current decision support tools

Several of the interviewees in the public audience and public authorities were asked whether they used any decision support systems or decision support tools, and all replied that they did not. However, most described a process of decision-making through committees, teams, or discussions within board meetings. This should be kept in mind when approaching Tasks in WP6 concerning the design of decision support systems.

# Appendix A: Interview protocol

## Interview protocol

**Section 1**

Again, thank you so much for much for taking part in this research. Keep in mind that we are asking your responses to these questions in your role as XXX, but if you have personal opinions and experiences of course you are welcome to share them as well.

1. What are some of the biggest changes in your job / institute / company / community / organization in the **last 10 years**?

2. What are some of the biggest challenges in your job/ institute / company / community / organization compared to **10 years ago**?

Follow-up:

- Is that something experienced before?
- How did your XXX respond?
- What's the difference between then and now (if any)?
- Are there conflicts with other ocean industries (Aquaculture? Tourism?)

3. What are some of the biggest opportunities for developing your institute / company / community / organization over the **next 10 years**?

Follow-up:

- Is that something experienced before?
- How did your XXX respond?
- What's the difference between then and now (if any)?

*Topics here can include: Follow-up: Climate changes, Carbon footprint, Circular economy, ecolabelling, spatial management*

4. What sustainability initiatives if any are on-going at your institute / company / community / organization? (This is aimed at conceptualizing what sustainability means to you in your role as XXX)

**Section 2: Specific to stakeholders (e.g., Mayors vs Academia vs Industry)**

5.

**Section 3: Connectivity**

So as I was explaining earlier, our project is about the cooperation between Greenland, Iceland, Faroes and then extended to Denmark Norway and the EU and Russia. So I´ll ask about each of these and could you describe if and how your company is related.

6. Faroes
7. Greenland
8. Iceland
9. Denmark
10. Norway
11. EU
12. Russia

13. Are there any countries with important connections we missed?

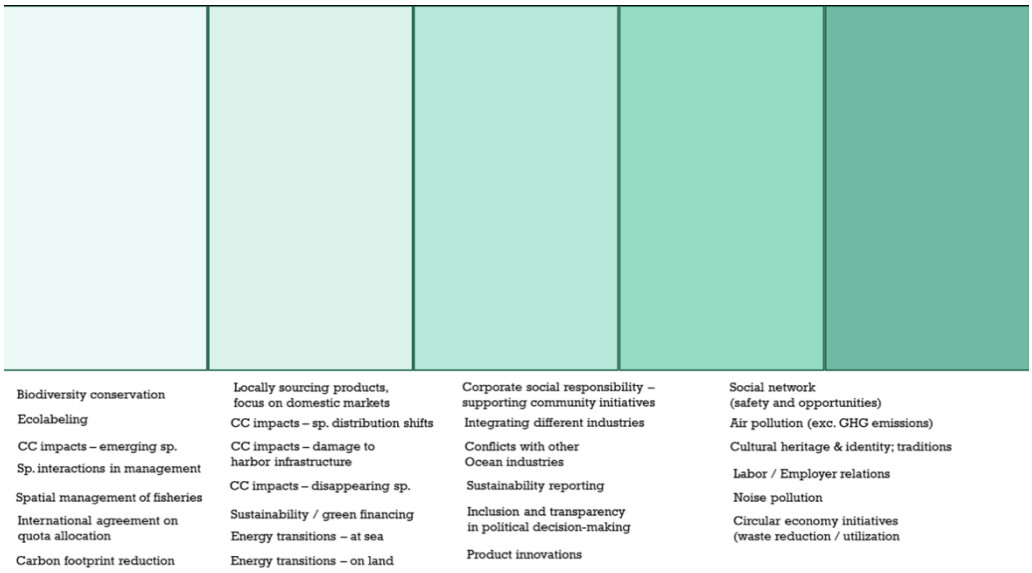
14. On a scale of 1-5 (1= not very dependent; 5= very dependent), how heavily does your company depend on relationships with:

| | |
|---|---|
| Faroes | |
| Greenland | |
| Iceland | |
| Denmark | |
| Norway | |
| EU | |
| Russia | |

15. How has the conflict in Ukraine affected operations in your business?

**Section 4: Ranking of topics**

I have a list of some topics that we think might be important to you in your role as XXX. Some are maybe some things we´ve already talked about and others might be new, or may not apply. I´m going to read one topic in a random order, and I would like it if you could rate how important this is to your role as XXX from 1 (least important) to 5 (most important). [and feel free to explain why as I record your answer]. If you don't know or don't think it applies you can let me know. Then we can talk about what would be a good measurable indicator of progress – to put another way, how could you measure progress in a desirable direction related to this item.




## Section 5: Anything else?

16. Thank you so much for taking part in the interview today. Is there anything else we haven't talked about that you think would be important for me to know? Now that you know a bit more about the project and the topics we are covering, is there anything specific that you think our team of experts might be able to answer for you? Is there anyone in your company/network that you think we should really talk to?