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"Fisheries in the AdriatIc Region - a Shared Ecosystem Approach"

D5.4.1. Best practices for developing an EAF from FAIRSEA experience

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FAIRSEA – Fisheries in the Adriatic Region – a shared Ecosystem Approach

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List of Acronyms used

AIS	Automatic Identification System
CBD	Convention on Biological Diversity
CFP	Common Fisheries Policy
CLLD	Community-Led Local Development
EAF	Ecosystem Approach to Fisheries
EMFAF	European Maritime, Fisheries and Aquaculture Fund
FAIRSEA	Fisheries in the AdrIatic Region – a Shared Ecosystem Approach
FLAG	Fisheries Local Action Group
GSA	FAO Geographical Sub Areas
IT	Italy
LL	Longline
LP	Lead Partner
LPUE	Landings Per Unit of Effort
LDSF	Local Development Strategies for Fisheries
MCDA	Multi Criteria Decision Analysis
OGS	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale
OTB	Bottom Otter Trawl
PP	Project Partner
PS	Purse Seine
PTM	Mid-water Pair Trawl
SDG	Sustainable Development Goal
SWOT	Strengths Weaknesses Opportunities Treats
TBB	Beam Trawl
VMS	Vessel Monitoring System
WP	Work packages

About FAIRSEA Project

The FAIRSEA is a European Territory Cooperation project financed under the priority 1 “Blue innovation”, Specific Objective 1.1 “Enhance the framework conditions for innovation in the relevant sectors of the blue economy within the cooperation area” of the INTERREG V-A Italy–Croatia Programme 2014-2020. The project focuses on the fisheries sector, key driver for the blue growth of the Adriatic communities, towards a sustainable co-management of resources and marine ecosystem protection. The transboundary nature of marine resources requires a cross-border cooperation and a shared “Vision” to properly tackle and address the different socio-economic and environmental challenges related to fisheries activities management. In this context, FAIRSEA Project aims at enhancing transnational capacity and cooperation in order to promote the sharing of knowledge and good practices between regional and transnational key actors in the sector of sustainable fisheries management in the Adriatic Sea as well as to implement innovative approaches adopting an ecosystem approach to fisheries (EAF). Coordinated by the OGS of Trieste (IT), the project involved a consortium of 12 strategic and operational partners from Italy and Croatia that made best use of their complementary expertise to address and support the application of the EAF ensuring a strong and interactive engagement of institutional, technical and socio-economic stakeholders in project activities.

The main result of the FAIRSEA Project is the development of an integrated platform for a quantitative ecosystem approach to fisheries that goes across territorial boundaries and across several disciplines. This high technological and innovative platform could be used as a planning tool to implement demonstrative testing of applicable fisheries policies both at local (subareas) and Adriatic scales. It provides a scientific basis for formulating and evaluating the shared management advice in the local and international participatory processes, involving management authorities, experts and stakeholders. The Project also provides an answer to the need of reference points, best practices and guidelines for the optimisation between ecological and socio-economical sustainability of fisheries in the Adriatic Sea.

Executive summary

The Art.2.3 of the Common Fishery Policy (CFP – Reg. (EU) 1380/2013) states "The CFP shall implement the ecosystem-based approach to fisheries management so as to ensure that negative impacts of fishing activities on the marine ecosystem are minimised and shall endeavour to ensure that aquaculture and fisheries activities avoid the degradation of the marine environment." In the same art.2 of the CFP the par.5(f) states that the regulation shall, in particular "contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects" and par.5(i) "promote coastal fishing activities, taking into account socioeconomic aspects". Therefore, the 3 pillars of the CFP are the environmental, economic, and social sustainability of fishing activities.

Furthermore, the goal of the action plan already announced in the EU Biodiversity Strategy for 2030, and planned for adoption in the spring 2022, is to exploit synergies between fisheries and environmental policies and help improve the implementation. It will directly contribute to the European Green Deal, by making fisheries more sustainable and protecting marine ecosystems and their biodiversity.

Therefore, best practices for developing an EAF from FAIRSEA experience are aimed to answer the question on the **best ways to involve stakeholders in the ecosystem approach and how to transfer the approach developed to local organizations and sub-regional scale** in order to achieve the EU objectives in fishery management. In the first part very short and pragmatic organizational aspects have been reported in order to provide useful elements for an effective development of an EAF, considering the **environmental, economic and social aspects from data to the stakeholder's engagement**. Then, the effective implementation of an EAF has to consider the local level and a smart approach in order to favour a shared enforcement of management measures resulting by the platform. Finally, a participatory framework based on the results of the decision support system implemented takes into consideration results coming from the ecological models and the Multi Criteria Decision Analysis (MCDA).

1. Best practices for developing shared EAF as emerging from FAIRSEA experience (in order to increase portability and repeatability of the approach at different spatial and temporal scales)

The approach developed in FAIRSEA resulted in several achievements and results, related to practices that were identified as beneficial to the process also by an evaluation posteriori. Highlighting and describing those best practices is essential in order to increase portability of results and repeatability of the approach. In particular it is envisaged that best practices that emerged during the FAIRSEA project might be used to apply the approach at different spatial level (e.g., extending the approach to the ADRION region or to the Mediterranean Sea). It should be acknowledged, anyway, that adaptations might be considered to specific regional and/or system differences. Overall, in the following chapters a synthesis of best practices adopted in FAIRSEA that the partnership proposes for an effective EAF application are presented.

1.1 Tools and methodological suggestions to improve communication and to allow a fruitful stakeholder involvement.

1) A corner stone of balanced engagement of stakeholders, to provide the most comprehensive picture of the basin where the EAF is applied, is the invitation to the events considering all the target groups: fishers, scientists, administrators (local, regional, national and EU), etc. Whether the events are managed for each target group separately or for all stakeholders together, they should have the opportunity to make their voice heard and to be timely notified about the meeting. Therefore, the invitations should be sent in all the languages of the nations involved by the EAF and through as many ways as possible, e.g. emails and the professional associations. The invitation should include the following information: a short description of the project and of the objective of the meeting, translated languages, other target groups attending the meeting and the logistical information.
2) The role of a professional facilitator can be useful in reaching the objectives of the meeting with an active involvement of participants. The facilitator should be an expert of fishery sector, out of the project partnership and unknown by participants.
3) Questionnaires are an effective tool to collect opinions from participants: the format online can be filled in in real time or after the meeting. The explanation of each question minimises the risk of wrong or incoherent answers by participants.
4) The collaboration between the participants to the meeting can be strengthened by the “Play decide” game because it improves the interactions and then the debate.

5) The Covid-19 pandemic highlighted that meeting in person is more fruitful and effective than online.

1.2 Sharing the ecosystem approach

Sharing the information related to the ecosystem approach is essential during the whole project and involving all the partners and stakeholders as much as possible:

- PARTNERS: an initial scientific agreement between the involved partners should be shared for the full availability in exchanging the needed data. The robustness of results is strictly connected to the reliability of raw data. Moreover, the quality of results is a cornerstone element for the stakeholder's confidence and their active involvement.

- ADMINISTRATIONS: the provision of updated and detailed information/data can be assured by the initial involvement of administrations. In fact, the results quality can be significantly improved by the availability of VMS data and/or updated socio-economic information.

- ALL STAKEHOLDERS:

1) The active involvement should start from sharing of the available scientific information posing attention to facilitating communication aspects: short presentations, open floor for questions, etc. A more effective exchange of information can be supported by the organization of sub-groups aimed to tailor the technical level of the information to the target group.

2) The informative basis planned at the beginning of the stakeholder involvement should include the overview of the management measures or other constraints already in force in the area, including European and national legislations, and limits to fishery due to other economic activities.

3) Considering the previous information, it is important that the main features of the EAF platform are explained in advance, also in terms of limitations and potential. This should be done in order to have a first look to the possible scenarios and discuss on their reliability. In fact, not all scenarios have the same degree of accuracy and reliability, because they depends also on the basis of the available scientific data and the comprehension and quantification of reference state, i.e., the current management measures. This step is needed to test the feasibility of the scenarios simulation on the platform and the consequent utility of results in the participatory process.

Basically, best process for EAF application seems to be co-development of the EAF data, approach, analysis and insights involving possibly all levels of stakeholders. Then, to assure life to the EAF approach, it should be developed at several scales, including the local one, which enables direct contact with the sector and a back-and forth interaction between managing authorities and stakeholders affected by regulations.

2. Sharing EAF objectives and viable solutions with stakeholders at local level

To make effective the EAF in the considered area, the socioeconomic aspects and the sharing of knowledge have to be considered at the local level. Moreover, given the objectives of the Common Fisheries Policy (CFP), the aim is to encourage Fisheries Local Action Groups (FLAGs) to launch initiatives to establish ecosystem fisheries management at the national level by adopting local fisheries development strategies based on an ecosystem approach, within the new programming period 2021-2027. Therefore, it is essential to provide rules for developing quality local strategies that focus on enabling fishing communities to create new and sustainable sources of income and to improve the quality of life of the community. One of the fundamental principles of regional development policy is the principle of partnership and cooperation between the public, private and civil sectors.

Viable solutions include the application of ecosystem and smart approach in the local development strategy in fisheries which is orientated towards ECOSMART local development strategies in fisheries. ECOSMART means ecosystem-based fisheries management which is a holistic way of managing fisheries and marine resources and it considers the entire ecosystem of the species being managed. ECOSMART strategy includes a comprehensive description of content and the structure that needs to be described. It is defining the target population, area of action analysis, SWOT analysis (Stregths, Weaknesses, Opportunities, Treats), goals and strategies, stakeholder inclusion, description of synergy with other policies, monitoring plan and financial plan. The steering of the Fisheries Local Action Group and local actors will be involved in the development of the fisheries strategy, which will conduct a joint analysis of the state of their area, based on a SWOT analysis. The analysis of the situation will enable the identification of challenges in the development of the strategy, the definition of the strategy and its goals, and the determination of priorities. The result is a local, integrated strategy focused on a small, clearly defined area and considers issues important to a wide range of stakeholders from that area. The partnership acts as a forum for building consensus between different stakeholder groups and has an advisory role in developing and implementing the strategy.

FLAGs are recognized as bearers of community-led local development, and support for activities for the development of fishing and aquaculture communities in coastal and continental areas is envisaged. The CFP emphasizes the consideration of regional specificities, through a regionalized approach and support for local initiatives in the development of community-led local development strategies.

The aim of the Best Practices is to explain the ecosystem approach, its principles, fundamental objectives and the benefits of its implementation. They should be seen as a document that provides

the information needed to commit to an ecosystem approach in the preparation of local development strategies, which is recognized as optimal for the sustainable development of coastal areas. The purpose of the Best Practices is to provide assistance and information to already established local fisheries action groups as well as to those yet to be established on the basic elements of initiating, leading, developing and implementing a local development strategy. Also, given the objectives of the CFP, it is intended to encourage FLAGs to launch initiatives to establish ecosystem fisheries management at the national level by adopting the Local Development Strategy for Fisheries (LDSFs) based on an ecosystem approach, within the new programming period 2021-2027 which should better focus on local challenges and define what can and what cannot be developed at the local level given the budget and geographical characteristics.

2.1 The role of FLAGs and the Local Development Strategies (LDSF)

The Local Development Strategy for Fisheries (LDSF) is a strategic planning and development document developed and implemented by the FLAG for the fisheries area concerned, and includes a harmonized set of measures, with related activities, aimed at achieving local goals and needs contributing to the Union strategy for smart, sustainable and inclusive development.

FLAG is a local initiative in fisheries, i.e., a partnership of representatives of public, civil and economic interest group or economic, civil and public sector of a particular fishery area established with the intention of developing a local fisheries development strategy in the area approved by the local fisheries development strategy.

Regulation (EU) 1139/2021 establishing the European Maritime, Fisheries and Aquaculture Fund (EMFAF) for the period 2021-2027 establishes an EU fund to support the Common Fisheries Policy (CFP), maritime policy and the EU program for international ocean management with EU funding. EMFAF provides financial support for the development of innovative projects that ensure the sustainable use of water and marine resources. This contributes to meeting the objectives of the European Green Plan, which sets out the EU's climate and environmental policies.

EMFAF contributes to the development of sustainable fisheries and the conservation of marine biological resources and to achieving the following objectives:• healthy and safe seas and oceans that are managed sustainably

- security of seafood supply
- growth of a sustainable blue economy

The EMFAF also contributes to the achievement of the 14th UN Sustainable Development Goal (SDG 14): Sustainable management to protect the oceans, seas, and marine resources, to which the EU is committed.

With the help of structural policy measures in fisheries and aquaculture co-financed by the EMFAF, selected priorities and objectives should be achieved at national level in accordance with the legislative framework at European Union level for the 2021-2027 programming period.

EMFAF supports innovative projects that contribute to the sustainable exploitation and management of water and marine resources:

- sustainable low carbon fishing activities
- protection of marine biodiversity and ecosystems
- supplying European consumers with quality and healthy seafood
- socio-economic attractiveness and generational renewal of the fisheries sector, especially with regard to small-scale coastal fishing
- development of sustainable and competitive aquaculture that contributes to food security
- improving skills and working conditions in fisheries and aquaculture
- economic and social dynamics of coastal communities
- innovation in a sustainable blue economy
- maritime security, i.e., security of coastal area
- international cooperation to achieve health, safety, and sustainable ocean governance.

The role of local development strategies in fisheries is to plan activities that will enable the achievement of the specific goal of development of fishing and aquaculture communities in coastal and continental areas. Local initiatives are a unique tool for fishing communities that allow them to design a future tailored to their own area and local stakeholders. In the framework of the implementation of the Common Fisheries Policy (CFP) and the Integrated Maritime Policy (IMP) of the European Union, aimed at the long-term goals of the Europe 2020 strategy for smart, sustainable, and inclusive growth, special emphasis is placed on sustainable local development.

LDSFs need to capture the bigger picture and apply an integrated approach to problem solving, not just look at the short-term effects of the economic, social, and environmental consequences of depleting fish stocks. Its purpose is to enable fishing communities to create new and sustainable sources of income and to improve the quality of life of the community. Through the preparation and development of a community-led local development strategy, they have the opportunity to come together and think about where they want to go in the coming years and how to use their budget. This is made possible by empowering local people, those who best understand the problems and aspirations of fishing communities, by offering them the means to implement and the financial means to develop and adapt solutions to their real needs.

According to FARNET research, some of the challenges that FLAGs are likely to face in the coming period and to which they need to respond are:

- sustainable food systems
- climate change mitigation and adaptation
- cleaner seas (including marine litter), balanced ecosystems and protection of marine biodiversity
- business opportunity development, including sustainable aquaculture and other blue growth sectors
- a place for young people: in fishing and the wider community
- safe, quality jobs and social inclusion for all
- a stronger role in management and an improved image of fisheries

In the light of experience to date, FLAGs should identify and focus their activities on those topics where this can make a real difference. When developing local development strategies for the new programming period, the direction of territorial development should be determined and adjusted in response to new needs. Planning is needed to prepare as much as possible for an unpredictable future, as shown by the various global crises experienced in recent decades (the 2008 Financial Crisis, the European Migrant Crisis a few years later and more recently, COVID-19). In the coming period, FLAGs as a unique tool for fishing communities will face new challenges.

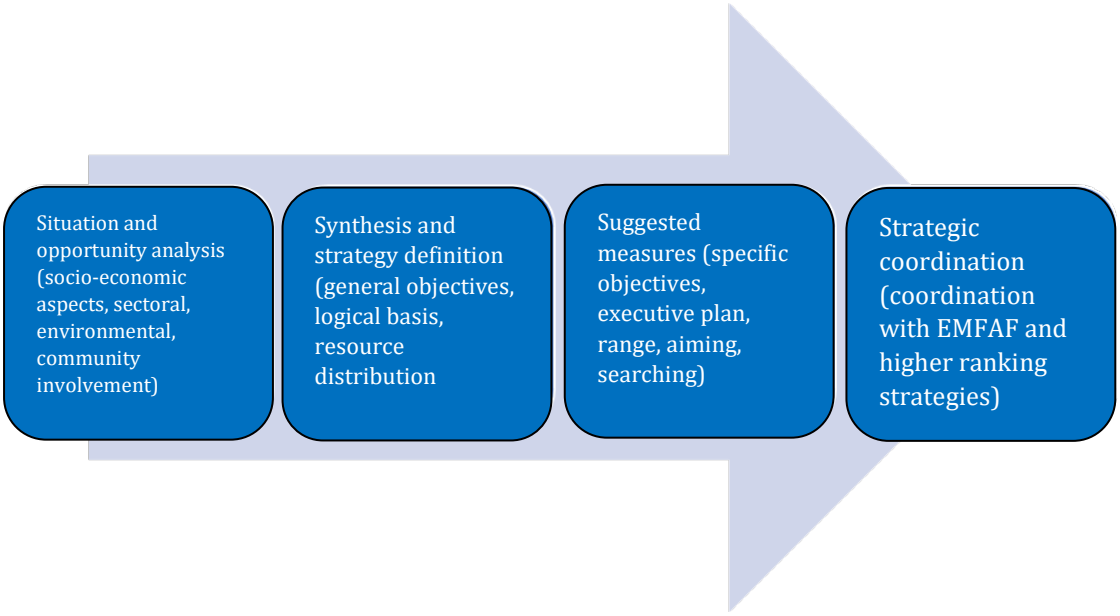
Applying the ecosystem and SMART approach to the protection and preservation of the marine environment in FLAG's new development strategies will contribute to achieving the goals and enabling sustainable blue growth and provide the means and equipment to respond and adapt to uncertain circumstances.

The development of effective strategies depends on the key steps in strategic planning:

- bottom-up participatory approach,
- good content appropriate to local needs,
- operational or business plan - how to make the strategy a reality.

Strategies for fisheries areas are drawn up through a bottom-up approach, which includes a representative cross-section of local stakeholders to take advantage of the specific knowledge that local stakeholders have about their area and to involve them in the development process and local fisheries action groups.

The structure and content of the LDSF are not strictly set according to a predefined template but allow some flexibility. Most importantly, the strategy shows that there is a certain logic throughout the document that links the analysis of the area, its needs and opportunities, priorities to be addressed, objectives, resources, and proposed implementing measures and synergies with other strategies and policies affecting the area. The structure and content should be in line with the Project Cycle Management Guidelines (Diagram 1). [1]



The development of LDSF is a unique process organized as a series of logical steps, with each previous step introducing or determining the elements crucial for taking the next one. LDSF should:

- be based on a detailed analysis of the situation based on comprehensive, relevant and up-to-date data, which indicate the economic, demographic, social and spatial-environmental challenges facing the local community;
- strategically present the approach to the development of the local community within a clearly defined period of time, establish a hierarchy of goals, development priorities and measures, which must be measurable, to address the aforementioned challenges;
- identify and propose an approach to the development of fishing and aquaculture communities through defined priorities / measures;

[1] Smjernice za upravljanje projektnim ciklusom, https://razvoj.gov.hr/UserDocsImages//arhiva/Publikacije//Smjernice_za_.pdf

- define the expected results and include a system of relevant indicators to be used to monitor the implementation of the LDSF;
- develop a system for monitoring, evaluating and reporting on the implementation of the LDSF.

One of the fundamental principles of regional development policy is the principle of partnership and cooperation between the public, private and civil sectors. The local actors, FLAGs and stakeholders will be involved in the development of the fisheries strategy, conducting a joint analysis of the situation in their area, based on a SWOT analysis (analysis of strengths, weaknesses, opportunities and threats). The analysis of the situation will enable the identification of challenges in the development of the strategy, the definition of the strategy and its goals, and the determination of priorities. The result is a local, integrated strategy focused on a small, clearly defined area which takes into account issues important to a wide range of stakeholders from that area. The partnership acts as a forum for building consensus between different stakeholder groups and has an advisory role in developing and implementing the strategy.

This strategy development process, in which all stakeholders are involved, has the following goals, which relate not only to the strategy but to the development process in general:

- develop a common understanding of the main problems, needs and opportunities of local fisheries areas;
- identify and agree on the importance of these issues for the area as a whole, for different groups, and in particular for local fishing communities and for different parts of the area;
- jointly identify and agree on the main causes of these problems and the internal strengths and weaknesses of the area, which can be applied in solving these problems;
- achieve greater awareness of all participants about common external threats and opportunities and their importance;
- develop a common vision and agree on a strategy to achieve the vision, which can serve as a model for involving key internal and external stakeholders;
- agree on what can best be achieved through Priority 3, as well as the main steps and measures to achieve this.

In organizing this process, EAF working groups and the community will usually need the support of technical experts because this complicated task requires continuous longer support, usually about six months.

2.2 Application of ecosystem and smart approach in LDSF

The ecosystem approach puts human needs at the heart of biodiversity management and does not go to short-term economic benefits. Such an approach aims to optimize the use of ecosystems without causing harm, with the aim of managing the ecosystem based on its properties and diverse uses.

Based on the Convention on Biological Diversity (CBD), decisions have been made on the ecosystem approach, setting out certain interrelated principles:

• The goals of land, water and living wealth management are subject to social choice.

• Management should be decentralized at the lowest appropriate level.

• Those who manage an ecosystem must consider the effects (current and future) of their activities on neighbouring and other ecosystems.

• Recognizing the potential benefits of management is a general need to understand and manage the ecosystem in economic terms.

• Preservation of the ecosystem structure and functioning with the aim of maintaining ecosystem services must be a priority goal of the ecosystem approach.

• The ecosystem must be managed within the limits of its operation.

• The ecosystem approach must be taken at an appropriate spatial and temporal level.

• Taking into account the different time periods and lagging effects that characterize ecosystem processes, ecosystem management objectives should be set for a longer period.

• Management must accept the inevitability of change.

•The ecosystem approach should seek an appropriate balance between the integration, conservation and use of biodiversity.

• The ecosystem approach must consider all forms of relevant information, including scientific knowledge, as well as indigenous and local knowledge.

• The ecosystem approach must include all relevant sectors of society and scientific disciplines.

Ecosystem-based fisheries management is a holistic way of managing fisheries and marine resources that takes into account the entire ecosystem of the species being managed. The goal of ecosystem-based management is to keep the ecosystem healthy, productive, and resilient so that it

can provide the services that people want and need. The traditional strategy for managing fisheries and other living marine resources was to focus on one species, in isolation. For example, if the population of a particular species is declining, the catch of that species in the next period is limited in order to reduce its over-exploitation. However, fishing is only one variable that affects the population of a species. In addition to fishing, other populations are affected by other elements, such as interactions with other species, the effects of changes in the environment or pollution, and other changes that affect habitats and water quality.

The aim of the FAIRSEA project is to strengthen capacity and cooperation in the field of ecosystem approach to fisheries (EAF) in the Adriatic region by exchanging knowledge and good practice among partners. When developing an LDSF, it is necessary to use the opportunity to exchange good practice and knowledge in order to plan goals tailored to the needs of local communities.

Ecosystem services to mankind for which the ecosystem should be maintained in a productive state are:

- Supply - the marine ecosystem supplies us with food (biomass), materials (e.g., sand, water), and energy
- Regulation and maintenance - receives waste, keeps habitats functional
- Cultural services – intangible services that have an impact on the mental state of the population

As sustainable management of renewable biological resources, conservation of the marine environment and nature protection are extremely important for coastal communities and development of complementary activities while preserving tradition and maritime heritage, it is important to encourage FLAGs to initiate and participate in ecosystem approach in fisheries management.

By applying an ecosystem approach in the preparation of their LDSFs, they can indirectly influence decision makers through a bottom-up approach. Their role in ecosystem management depends on the management concept being implemented. In this sense, three basic scenarios can be expected in the future:

- Fisheries management based on the ecosystem principle has been introduced
- Fisheries management based on the ecosystem principle is being introduced
- Fisheries management based on the ecosystem is not applied

It should be emphasized that the third option is inclusive in terms of introducing ecosystem fisheries management. Integrated ecosystem assessments need to be used in all three scenarios.

In the case of the established framework for ecosystem fisheries management, FLAG should single out those elements that relate to the territory in which the fleet fishes. In the event that ecosystem management is not in place, FLAG may encourage the launch of such management in a given territory. In both variants, it is crucial to spatially define the parts of the fishing sea of interest to the FLAG fishing fleet. Ecosystem fisheries management is based on up-to-date data collection. FLAG that wants to include an ecosystem approach should encourage the establishment of a network of organized stakeholders who are educated and equipped to collect specific, measurable, and ecosystem-relevant data.

The planned strategic objectives should be based on an ecosystem approach regardless of the level of fisheries and / or aquaculture management. In line with the participatory approach, the ecosystem approach needs to be discussed. In order to strengthen small island and coastal communities and the sustainable development of fisheries, it is necessary to define goals that will contribute to the protection of marine biodiversity and ecosystems. Well-organized and educated stakeholders with an adequate amount of relevant data, with expert assistance that can also be encouraged by FLAG, can indirectly influence decision-makers through a bottom-up approach and encourage the introduction of safeguards in certain areas. As the seas and coastal areas are increasingly influenced by human activities, maritime spatial planning, integrated coastal zone management and the ecosystem approach are interconnected elements and must be integrated into the development of future strategies. When determining the priorities, goals and measures of the LDSF, it is necessary to perform an integrated analysis of all sectors that directly and indirectly affect ecosystems, from the assessment of the state and trends to the competition of different activities in the same area. For the adoption of the LDSF, it is necessary to use integrated ecosystem assessments on the basis of which the goals of development strategies in the area of the local action group will be determined. Such integrated assessments shall include assessments and trends in the state of the ecosystem, including ecosystem services, assessments of activities or elements in the ecosystem that may highlight it, and the prediction of the future state of the stressed ecosystem if no management measures are taken. All forms of relevant information should be considered, including scientific knowledge, as well as indigenous and local knowledge, which improves the ability to predict the impact of planned objectives and facilitates compromise between different stakeholder priorities, balancing economic, social, and environmental needs.

In order to be able to introduce an ecosystem approach to the development of LDSF, it is necessary to:

- Harmonize fisheries strategies and management at the local level through legislation at the national level.
- Provide an information system and platforms with all the necessary information to ensure the use of integrated ecosystem assessments.

FLAGs can promote an ecosystem approach in their LDSF by setting priorities and goals that will contribute to keeping the ecosystem in a productive state so that they can provide them with the necessary services such as:

- Biomass conservation
- Maintenance of functional habitats
- Maintaining a pleasant environment

In order to promote the sustainable development of the blue economy in the local area, FLAGs should initiate trainings for fishermen and breeders on the importance of the ecosystem approach and the possibilities of conserving biological resources in their development strategies. In order to upgrade the existing data collection systems, it is possible to initiate from the local level the participation of fishermen in collecting the necessary data as well as the valorisation of already collected data for species that are important for local fishing communities. By encouraging the development of complementary activities, the introduction of innovative and selective tools will contribute to the maintenance of functional habitats and a pleasant environment. Additional education of fishermen on sampling procedures and data collection methodology is needed, on the basis of which the sustainable development of the blue economy can be planned. To plan future human needs and activities in a marine area that meets environmental, economic, and social goals, it is necessary to use tools to reduce conflicts between different stakeholders, while reducing the impact of human activities on marine ecosystems. The ecosystem approach and application of integrated coastal management models in the development of LDSF improves our ability to predict the impact of planned objectives and facilitates trade-offs between different stakeholder priorities, balancing social and environmental needs. With the development of the national FLAG network in the Republic of Croatia, initiatives from local levels towards the introduction of an ecosystem approach to fisheries management at the national level and their implementation in the wider area are possible.

2.3 ECOSMART LDSF in brief

In order to quickly understand the main points of the ECOSMART LDSF, it is useful to give a brief summary at the outset. In this section, the main points of the strategy based on the ecosystem approach should be clearly stated on two or three pages. It should include the basis of the partnership of community members, the area, and its main features, defined main challenges and opportunities, general theme or focus of the strategy and why it is appropriate, general goal, measures implemented by the strategy, total amount, and balance of invested funds, what the strategy aims to achieve.

- **Definition of the area and population to which the strategy applies.**

The strategy should therefore precisely define and describe the target fishery area and its key identifiable features to explain why the strategy should be based on that area. Clarity and focus are important as a key element of strategy justification. ERDF regulations make it clear that the boundaries of a FLAG do not have to follow the administrative boundaries of the area, although there are certain advantages in defining areas along the boundaries of local administrative units. One of the main reasons is that these are the levels at which key information is presented, so the description of the area and situation is all the more accurate. A strategy based on an ecosystem approach should clearly define the fishing areas that are of interest to fishermen in their area, depending on the size of the fleet and the fishing gear used for commercial fishing. It is necessary to clarify which fishing areas are of interest to fishermen of a particular FLAG and which ecosystems are affected by fishing activities.
It is necessary to identify within each fishing area (fishing zone):

- Habitats and ecosystems
- NATURA 2000 sites
- Protected areas, special habitats
- Areas with special fishing regulation

To adopt LDSF, it is necessary to use or develop integrated assessments and trends in the state of the ecosystem. In this part, it is necessary to identify the ecosystem services that need to be preserved, as well as the activities or elements in the ecosystem that can cause unwanted irreversible changes. If fishermen fish for migratory species and the fishing area is outside the fishing zones that gravitate to the FLAG area, this should be indicated as the area of interest of the fishermen in the fleet analysis. If the majority of FLAG fishermen fish with passive gear in the coastal area as well, emphasis will be placed on species and habitats of interest to fishermen. All specific criteria set by the managing authority and the EMFAF criteria for determining the area in terms of population density, dependence on fisheries and the presence of small fishing communities should also be taken into account.

- **Analysis of development needs and potentials of the area.**

The strategy should be an analysis of the social, economic and environmental context of the fisheries area. The analysis should be conducted by team members or experts should be hired. The analysis should be of a modest scope, presented according to Priority 3, its focus, and the reach of its potential effects. Information and data should be relevant and specific and narrowly focused on the local fishing area or area of interest. This part of the analysis should mostly use secondary sources, i.e., published statistics showing basic determinants and trends. Relevant reports and studies should also be found. At this stage, it is also important to consider the coherence of the strategy with other strategies and programs relevant to the local area and how they should be complemented or added to their activities. They could also offer useful data and analysis or enable the identification of useful data sources. Problems may arise regarding the spatial suitability of some databases in certain fisheries areas. In such cases, contracting with or without the support of the managing

authority should be considered. Key socio - economic data sets to be assessed include: population living in a given area and profile of that population, number of jobs in that area, employment by sector and sex, full - time and part - time, skills and qualifications, unemployment, economy, business basis, number and size of enterprises, infrastructure and access to services, denial and lack of rights. The strategy should also offer basic environmental information and analysis relevant to the fishing area, including any labels. It should also identify natural resources that could be important to the strategy. Regardless of the fisheries management concept currently being implemented, it is necessary to make an inventory of the available data on the ecosystem(s) in the territory of interest to the EAF analysis. In particular, it is necessary to analyze the available data from Natura 2000 sites, protected areas, areas of special habitats and areas with special fishing regulations where the priority is to preserve the good state of the environment. In addition to secondary data sources, innovative solutions such as a spatially explicit management platform can be used for analysis. In each case, specific dimensions relating to the fishing area and sector should be selected and highlighted. The analysis should conclude on the key challenges and opportunities facing the fisheries area, which EAF will take into account when developing the strategy.

- **SWOT analysis**

  The strategy should include a high-quality SWOT analysis based on the main features of the fisheries area, the socio-economic and environmental context, a review of documents and policies, consultation with the community and stakeholders, and any additional expertise and input. The SWOT analysis should not only be a list of strengths, weaknesses, opportunities, and threats, but should show an analysis of the consequences of these factors on the fishing area and the community and offer a basis for deciding on priority activities and resources. It is a basic element that connects the factual foundations, community involvement and the proposed program. In the analysis of strengths, weaknesses, opportunities and threats, the broader impact of certain activities on the marine ecosystem should be analyzed.

  Depending on the status of the fishing area gravitated by FLAG, elements of ecosystem management may have different status in the SWOT analysis.

  For example, in conditions of completely absent ecosystem management, ecosystem management is a weakness, but also an opportunity for improvement. In conditions of partial or systematic ecosystem management, it is strength. In special situations where ecosystem management diminishes the business efficiency of stakeholders who are endangered by less environmentally friendly but more market-competitive products, this can be a weakness or a threat, depending on where it comes from.

- **Strategy development, main goals and logical basis**

The principles of Community-Led Local Development (CLLD) change conventional top-down approaches to development because they start from the vision of local actors and their desired positions and changes that they believe should be introduced to achieve this goal. Achieving a clear agreement on the "desired changes" is the first and most important step in structuring the strategy. It should be clear that the fisheries development strategy is based on a combination of ecosystem-based analyses and consultation results. This implies a brief synthesis of the conclusions of the analyses and consultations and an agreed main focus and general or overarching goal of the strategy. The general objective of the ECOSMART local fisheries development strategy should include everything that the fisheries development strategy wants towards an ecosystem approach. The goal should be clearly defined and measurable.

The success of an ecosystem approach depends on achieving balance at two different levels:

- One level is to find a balance between the conservation and sustainable use of fishery resources within the boundaries of ecosystem functioning.
- The second level is the integration of environmental, economic, and social objectives into the management of specific geographical areas, which requires trade-offs between different sectors in setting strategy objectives.

Objectives should cover a longer period of time, must be technically feasible and realistic given the available resources and time constraints. This then can/should be expressed in SMART terms:

- Specific: clearly states what the project will address and by what means
- Measurable: the goal is determined by measurable indicators
- Achievable: technically feasible given the scope of the proposed activities
- Relevant: achievable considering the available resources, time limit, size of the target group
- Time-bound: contains the date by which the goals should be achieved

The goals of the LDSF do not have to address all issues at once or attach equal importance to everything. Communities need to make decisions and focus on goals that are most likely to achieve a vision of the desired state in a defined period of time. Objectives must be realistic and take into account the capacity of communities and users in the FLAG area.

The priority of goals should be emphasized in the strategy. The most important, second, third, etc. goal will be agreed by FLAG. Prioritizing goals is also important due to limited resources and allows for the exclusion of activities if there are insufficient financial resources. In addition, there is the possibility of allocating larger financial resources to priority activities and placing them at the beginning of the timetable for the implementation of the strategy.

Specific objectives and measures - action plan

The analysis and consultation will result in proposals for a set of actions or measures to be implemented in order to achieve the general objectives. They should be described in the

strategy and for each of these measures a data table should be prepared that follows a certain format and contains the following elements: specific objectives, logical basis, scope of activities.

- Specific objectives

Specific objectives are determined on the basis of the discussions held at the workshops and should be based on an overview of environmental conditions and knowledge from the prepared Situation Analysis. The specific objectives emphasize the need and possibility of exploiting untapped or underutilized potentials located in the FLAG area.

- Logical basis

It is necessary to describe the type of activities and measures that will be taken to achieve the objectives that need to be interlinked. It is necessary to define users (target groups) and determine selection criteria. The activities of the strategies are directly linked to the measures of the National Programs which are in line with the priorities of the EMFAF.

- Scope of activity

When determining the activities of the ECOSMART strategy, it is necessary to plan measures and initiatives that contribute to the protection of the marine environment, inland watersheds and improving freshwater quality, reducing marine eutrophication, reducing greenhouse gas emissions, protecting bird habitats and improving the wider marine environment.

In order to achieve a balance between conservation and sustainable use of fishery resources within the functioning of ecosystems, economic and social objectives in defining specific objectives in ECOSMART strategies it is necessary to harmonize different sectors and their impact on marine ecosystems. The specific objectives of the strategy should help in the sustainable development of fisheries taking into account environmental constraints (e.g., protection and restoration of habitats, reduction of pollution and waste) as well as the socio-economic development of the local community (e.g., increase of income and balanced development of activities).

The types of activities and measures to achieve specific objectives should contribute to raising awareness of the importance of ecosystem conservation and the involvement of the local community in active participation, increase the competitiveness of fisheries and aquaculture and reduce the human footprint on the environment. The following interventions and activities that can be initiated by FLAGs are for example:

- Restructuring and modernization of plants and procurement of equipment to add value to products and increase quality (processing).
- Supporting diversification and new forms of income that contribute to the conservation of endangered species.
- Exploitation of economically less important species as well as the use of species from organic farming.

- Construction of artificial reefs and encouragement of diving tourism.
- Promoting a sustainable approach to performing activities such as repairing and maintaining vessels in an environmentally friendly way, which will contribute to the preservation of cultural services (preservation of a positive atmosphere)
- In case of insufficient coverage of the fishing area with ecosystem data / has the collection of data needed to analyse the state of the marine ecosystem in its area (monitoring) and upgrade the system to assess and predict future conditions in different management scenarios and assess the success of management actions in achieving desired target conditions, e.g., collecting data on the status of certain species economically important in the local area, the occurrence or absence of certain species in the local area, the occurrence of introduced and invasive species, etc.)
- Monitoring and maintenance of the state of the marine environment and the coastal area (e.g., monitoring of bay cleanliness, pollution occurrence, submarine cleaning actions)
- Encouraging lifelong learning, disseminating scientific and technical knowledge on sustainable fishing and aquaculture.
- Adaptation of vessels using renewable energy sources, reduction of pollution or greenhouse gas emissions.
- Identification of ecosystem content - habitat mapping and determination of the size of areas that can be considered ecological units in order to identify potential no-fly zones or in the case of, for example, Natura site 2000 on the identification of potential isolated areas in which ecosystem management would be introduced.
- Encouraging young people to engage in occupations dealing with marine environment issues and the application of new technologies for ecosystem conservation also through use of entertaining approaches for informing and increase awareness.
- Encouraging the construction of educational centres (marine aquariums, use of virtual reality technology, school for fishermen).

- Description of the involvement of local stakeholders in the development of the LDSF

Describe how local stakeholders participate in the preparation and adoption of the strategy, how to involve the local population in a partnership based on the public, civil and economic sectors and explain the purpose of the partnership in relation to the implementation of the strategy and the way of adopting the model and work. The description of the involvement of local stakeholders includes the manner of participation of local stakeholders, partners in the preparation and adoption of the strategy, the manner of involvement of the local population in the partnership based on the public, civil and economic sectors. In addition, it is necessary

to explain the purpose of the partnership in relation to the implementation of the strategy and the way of adopting the model and work.
Through all stages of strategy preparation, stakeholders should be familiar with and agree with the ecosystem approach adopted by the LDSF.
- Consistency and synergy with other policies. The LDSF needs to be aligned with other local policies, strategies, and interventions. It is important to avoid activities that may cover other policies. It is necessary to explain the way in which compliance is manifested. For elements that could be interpreted in two ways in terms of other policies, a special compliance analysis needs to be made. Achieving better coherence with other interventions will help ensure the best value for the effort and resources invested in different funding programs. This will also help to avoid duplication and overlap of activities. The strategy should describe how this will be achieved in practice; this is most often illustrated by a table showing what other policies and programs exist and the scope of their activities and interventions.
- Complementarity and delimitation. The extent of the complementarity of this measure with other initiatives should be briefly described. This implies internal complementarity between the EMFAF strategy and programs, and external, with other programs or initiatives. Any additional measures specific to a particular measure should also be highlighted in order to clearly delineate project activities.
- **Method of monitoring, evaluation and description of LDSF implementation capabilities.** Describe the process of implementing the strategy and the process of monitoring. It is necessary to explain the system by which the implementation of the local development strategy in fisheries will be monitored. Monitoring the implementation is an integral part of FLAG's activities, for which it is necessary to give a description of the activities and capabilities of its employees.
- **Financial plan.** The financial plan should present numerical indicators, planned revenues and expenditures, expected costs of FLAG and planned costs of LDSF implementation. It is necessary to present the planned revenues and expenditures by type of revenues / expenditures and by year of LDSF implementation.

2.4 Use of integrated spatial platforms in LDSF

To predict the future state of the stressed ecosystem in different management scenarios and assess the success of management actions in achieving the desired target conditions, through the FAIRSEA project, a platform was developed as a tool that will facilitate management decisions. During the development of the LDSF, stakeholders will be able to directly access the content of the platform with the combined oceanographic data, as well as catch data by species and biomass, according to the GSA area in cells of approximately 7 km x 7 km.

In order for the planned strategies to be as effective as possible, decision-makers will have access to the results of scenarios on the basis of which they will be able to determine the goals of the strategies

and define priorities. By analysing the state of economically important species as well as the impact of their reduction on the ecosystem in the interest of fishermen from the area of a particular FLAG, it is possible to suggest different scenarios that will be able to propose conservation measures from a bottom-up approach. This approach can facilitate decisions by different stakeholders and the development of the local community in a long-term environmentally, economically, and socially sustainable way.

The application of a decision support system (DSS) in the development of LDSF can help the community use data and models to solve unstructured problems. Although FLAGs are not decision makers in fisheries management in the Republic of Croatia, the analysis of the obtained scenario results can encourage the adoption of certain management measures in areas of their interest in order to preserve ecosystems. When analysing the situation and discussing the proposed goals of LDSF using DSS, it could be easier to determine the main goal that leads to solving the problem as much as possible. A support system is defined as interactive communication between one or more models and users or groups of users providing the basis for decision making. The model base consists of several models: stakeholders, goal hierarchy, weight criteria, and alternative comparison models. The goal hierarchy model encompasses all segments such as environmental, social, economic, and technological and represents the basis for generating alternative solutions. The model database coincides with the database of the same DSS model and allows a combination of different data types which contributes to the objectivity of the whole procedure. The analyses carried out in FAIRSEA focused mainly on trawlers, but the concept of the system can be adapted and applied to make decisions and simulate potential alternative scenarios including other fishing gears. It might be necessary to make small adaptations before their implementation and to involve local communities to help preparing LDSF for long-term sustainable fisheries.

3. A participatory framework based on the results of the decision support system implemented

FAIRSEA scenarios were developed on the basis of perceived scientific relevance of the partnership, regulations under application in the area (see Multiannual Management Plans and their effects) as well as perceived importance from stakeholders.

The scenarios were set after international stakeholder meetings that were fundamental to define main issues and main strategy that the sector would like to be analysed. Additionally, a series of technical meetings proved to be relevant in giving local insights on main problems also in terms of practical applicability and effects of proposed solutions.

The use of demonstrative tools for showing the widely integrative framework used proved its efficacy in gathering the consensus and trust of stakeholders. Notably in several instances the discussion considered the quality of data input available and included in the integrated FAIRSEA approach. The open discussion was giving insights on sectors where data quality and their reliability is too low for the sector to accept measures, but also areas of work that the stakeholders promoted. Below a synthesis of SWOT applied to all the scenarios developed with the different tools, SMART, ECOSPACE and BEMTOOL, is presented.

Model	Scenario	Strengths	Weakness	Opportunities	Threats
SMART	**S1:** *Status quo* (including the presence of the Pomo Fisheries Restricted Area)	Expected improvements of biological conditions for some stocks (i.e. HKE and NEP) distributed on the platform and on the shelf	Expected worsening of biological conditions for some coastal stocks (i.e. MUT)	Easier approach to implement and eventually develop, since based on the control of a relatively small area	This scenario could lead to an increase of fishing effort in more coastal areas
SMART	**S2:** S1 + closure of the 6 nautical miles zone (coastal area)	Very effective for most of the stocks in terms of improvement biological conditions	Dramatic consequences for the fleets in terms of landings and profits		Collapse of the fisheries in terms of economic performance
SMART	**S3:** S1 + effort reduction up to 30% in 3 years	Expected improvements of biological conditions for some stocks (i.e. HKE and NEP) distributed on the platform and on the shelf	Not effective in protecting coastal stocks (i.e. MUT)	Could determine an improvement of fisheries performance in the mid-term, also as consequence of the improved conditions of some stocks	
SMART	**S4:** S1 + Extended late summer ban (total stop in September/October, -40% of the normal effort in November)	Expected improvements of biological conditions for some stocks (i.e. HKE and NEP) distributed on the platform and on the shelf	Not effective in protecting coastal stocks (i.e. MUT)	Could determine an improvement of fisheries performance in the mid-term, also as consequence of the improved conditions of some stocks	
Participatory process	A large participatory process, involving 32 stakeholders, 18 from Croatia, 13 from Italy, 1 from Slovenia, and 13 belonging to fishers/associations/cooperatives, 8 to researchers, 4 to public authorities, 2 to NGOs, 5 to other categories, identified a set of scenarios to realize several management objectives. These are achieving FMSY, while improving the fishing pattern and guarantee durability of the results but preserving at the same time sustainable socio-economic conditions. The prioritized scenarios were: 1) Managing nursery/spawning areas, 2) Seasonal fishing ban, 3) Spatial fishing ban, 4) Managing sensitive habitat.				

Model	Scenario	Strengths	Weakness	Opportunities	Threats
BEMTOOL	**S0** Status quo	S0 benefits of the effects due to the transition phase, during which a reduction of the fishing effort already took place and the stocks start to recover. In S0 the stocks which fishing mortality is close to the reference point would continue to be exploited near to the optimal harvest strategy. In addition, the economic performance of the fleets, especially those (beam trawlers) targeting mainly the stocks close to a sustainable exploitation (common sole) is not perturbed.	The biomass of the stocks sustainably exploited has a decreasing trend. In addition, there are at least four assessed stocks with a ratio F/F_{MSY} higher than 2 and 1 stock with a ratio at 1.5. This implies an exploitation at a suboptimal level compared to the potentials of the stocks. The MEY is currently exceeded of at least 20%. The discarding will continue as usual.	No opportunities.	Though not simulated in BEMTOOL, there is the risk that external drivers, as the effects of climate change, might negatively impact the stock productivity in the medium terms (for example *via* the recruitment success), determining a further deterioration of the status of the stocks more vulnerable by such impact.
BEMTOOL	**S1** only fishing days reduction	Under Scenario S1, F would get or even be lower than Fupper for all the stocks except two. SSB would increase for all the stocks, positively influencing the productivity. This would positively affect the revenues of the small scale fleets in the	Considering the mixed fishery features, the landings, revenues and all the economic indicators of the beam trawlers, which main target is common sole, a stock in sustainable conditions, would be very negatively impacted in the short and medium terms. For these fleets all the economic	Subsidies for compensation and incentives to maintain more sustainable fisheries practices might be introduced with the new structural funds for fishery (FEAMPA 2021-2027). Given that the amount of landings for some fleets would decrease, the market might react with a	The dependency analysis showed that revenues are quite dependent (>30%) by the assessed and regulated species, for almost all the trawl and beam trawl fleets. Since 2004-2010 to 2016-2018 a decrease of the employment of 10% for all

		short and medium terms. Overall the tendency of the economic performance (i.e. profits and the balance indicator R/BER) will moderately improve in the medium terms. Also the wages would improve considering the current crew share system. The discards will decrease and so the Landing Obligation would pose less management problems.	indicators will enter in a negative loop. Though to a lesser extent, the landing and revenues of most of the trawler fleets would be impacted too. If the exploitation pattern will not change the improvement of the stock productivity in the medium term would not be durable.	premium price, beyond the dynamic of model assumptions.	the fleet has been observed, likely as a consequence of fishing vessel withdrawal. It has been then assumed that under much reduced fishing opportunities the employment might decrease of about 5%, because trawl fishery enterprises might not have sufficient resources for competing during a period of 2-3 years until a new equilibrium is reached. This loss has been considered as definitive. The market may react to the lower landing in the short terms with an increase of the import.
BEMTOOL	**S2** composite scenario	Under Scenario S2, F would get in between Flow and F_{MSY} for two stocks, while for one stock it will be in between F_{MSY} and Fupper. For European hake it will get close to Fupper. SSB would increase for all the stocks, positively influencing the productivity.	This scenario would have an impact on the economic indicators in the short terms, given the loss of revenues consequent to the increased selectivity. In the medium terms the impact will be less severe than under S1. Considering the mixed fishery features, the landings, revenues	Subsidies for compensation and incentives to maintain more sustainable fisheries practices might be introduced with the new structural funds for fishery (FEAMPA 2021-2027). Use incentives for improving selectivity of the fishing gears is an opportunity.	The dependency analysis showed that revenues are quite dependent (>30%) by the assessed and regulated species, for almost all the trawl and beam trawl fleets. Since 2004-2010 to 2016-2018 a decrease of the employment of 10% for all the fleet has been observed,

		This would positively affect the revenues, and such effect is more wisely (compared to S1) distributed among the different fleets and metiers. Overall the economic performance will improve in the medium terms, considering profits and the balance indicator R/BER. For certain fleets even better than in S1. Also the wages would improve, under the current crew share system. The discards will decrease and so the Landing Obligation would pose less management problems. Considering that the exploitation pattern in this scenario will improve, also the improvement of the stock productivity in the medium term would be durable.	and all the economic indicators of the beam trawlers that mainly target common sole, which is in sustainable conditions, would be negatively impacted in the short and medium terms, although less than in S1.	Given that the amount of landings for some fleets would decrease in the short terms, the market might react with a premium price, beyond the dynamic of model assumptions. Incentive for co-management implementing pilot actions for fishing facilitating control and improve access to the market.	likely as a consequence of fishing vessel withdrawal. It is assumed that under reduced fishing opportunities the employment might decrease of about 3%, because trawl fishery enterprises might not have sufficient resources for competing during a period of 2-3 years until a new equilibrium is reached. The market may react to the lower landing in the short terms with an increase of the import. Control might be more difficult in this scenario because of the complexity of the measures (gear selectivity and closed areas).
Participatory process	A dedicated participatory process was carried out to assess the preferences of the stakeholders regarding the management scenarios simulated using the BEMTOOL bio-economic model. The results are expressed in terms of the performance of utility functions associated to three groups of indicators: socio-economic, ecological, and pressure-impact. The overall ranking of the three simulated scenarios was: Scenario S0 status quo: 0,39; Scenario S1 only fishing days reduction: 0,68; Scenario S2 composite scenario: 0,77.				

Model	Scenario	Strengths	Weakness	Opportunities	Threats
ECOSPACE	Sensitivity of different FRAs: **Pomo Pit FRA**	Large positive effects in the medium term with increase of biomass for European hake (doubling) and Norway lobster (four times the reference) locally in the protected area.	Minimal cascading effects on other species: positive effects are concentrated on the two target species (hake and Norway lobster), because no simulated modification of effort.	Spill over of European hake and Norway lobster is having positive effects in the whole Adriatic Sea in the medium term with increased biomasses and catches by 5% even in absence of any effort regime control.	Predation by European hake might negatively affect Deep Water Rose Shrimp (decrease by 15% in the whole area) and displacement of fisheries impact on red mullet with a decrease in both biomass and catches at sea (-3%).
ECOSPACE	Sensitivity of different FRAs: **Bari Canyon**	Effects in the medium term with increase of biomass for European hake (+25%) and Norway lobster (+50%) locally in the protected area.	The positive effects are diluted in the whole Adriatic with almost no effects on all target species, except hake.	Spill over of European hake is having minimal positive effects in the whole Adriatic Sea in the medium term with increased biomasses and catches by 1% even in absence of any effort regime control.	NA
ECOSPACE	Sensitivity of different FRAs: **Northern Adriatic Sanctuary**	Increase of biomass (between 2-8%) inside the FRA for common sole, mantis shrimp in medium term.	The positive effects are highly diluted in the whole Adriatic.	Potential indirect effects on other demersal species, but great uncertainty.	Displacement of fisheries with no control of effort is affecting the resources, with small (max -0.5%) but consistent reduction of catches and biomass outside the FRA in the context of constant effort regime.

Model	Scenario	Strengths	Weakness	Opportunities	Threats
ECOSPACE	**S1** (coastal closure)	Possibly easy to implement, but	Minimal positive effects on biomasses inside the 6NM. Large uncertainty from this modelling approach because recruitment and juvenile habitat dynamics might be considerably improved to be accurate.	NA	Displacement of trawling outside the 6NM strip result in small reduction of biomasses of key demersal target species (European hake, common sole)
ECOSPACE	**S2** (effort reduction as foreseen by MAP for 2022-2026)	Rebuilding of Red mullet and European hake (+5% and +10% biomass), biomass increase also for Norway lobster, Common sole, mantis shrimp (+2/3 %) in the medium term.	Small decrease of biomass for anchovy (-2%) due to predation	In spite of effort reduction, there will be an increase of catches in the medium term (after 10 years from application of the management activity) by 3% for European hake and 1-2% for Norway lobster and Red mullet.	Short terms effects are highly negative for the fisheries sector with decrease of catches for towed gears in the order of -15% with respect to reference scenario. In the long-term large decrease (-8%) decrease of catches for Deep water Rose shrimp.
ECOSPACE	**S3** (effort reduction as foreseen by MAP for 2022-2026 and implementation of Bari and Northern Adriatic FRAs	Rebuilding of Red mullet and European hake (+8% and +12% a in biomass), biomass increase also for Norway lobster, Common sole, mantis shrimp (+2/3 %) in the medium term.	Small decrease of biomass for anchovy (-2%) due to predation.	In spite of effort reduction, there will be a slight increase of catches in the medium term (after 10 years from application of the management activity) by 2% for European hake and 1% for Norway lobster and Red mullet.	Short terms effects are similar to those od scenario S2. In the long-term large decrease (-6%) decrease of catches for Deep water Rose shrimp.

Model	Scenario	Strengths	Weakness	Opportunities	Threats
ECOSPACE	**S4** (climatic changes affecting biomass of phytoplankton)	First level assessment of climate change effects.	Scenario is affecting species through reduction of biomass of phytoplankton and bottom temperature changes. Other effects of climate change might be considered to increase the accuracy of estimates.	Sardine and Norway lobster benefit from climate change with an increase in biomass at sea of approximately 3% and 1% respectively. This might be an opportunity in catches	Strong reduction of biomasses at sea for Anchovy, Hake, Mantis shrimp, common sole and deep water rose shrimp species: reduction range from -5% and -10% in the medium long term.
Participatory process	A large participatory process, involving 32 stakeholders, 18 from Croatia, 13 from Italy, 1 from Slovenia, and 13 belonging to fishers/associations/cooperatives, 8 to researchers, 4 to public authorities, 2 to NGOs, 5 to other categories, identified a set of scenarios to realize several management objectives. These are achieving FMSY, while improving the fishing pattern and guarantee durability of the results, but preserving at the same time sustainable socio-economic conditions. The prioritized scenarios were: 1) Managing nursery/spawning areas, 2) Seasonal fishing ban, 3) Spatial fishing ban, 4) Managing sensitive habitat.				

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