Technical Report on Best Practice Guidelines for casting and profiling Ecosystem Services management tools in European Outermost Regions and Overseas Countries and Territories

Acronym: MOVE

Title: MAPPING AND ASSESSING THE STATE OF ECOSYSTEMS AND THEIR SERVICES IN THE OUTERMOST REGIONS AND OVERSEAS COUNTRIES AND TERRITORIES: ESTABLISHING LINKS AND POOLING RESOURCES

Grant Agreement n° 07.027735/2018/776517/SUB/ENV.D2

Activity Name: Activity 4 – Facilitating MAES in Europe's Overseas
Task Name: Task 4.2 – Test and assess science-policy interface tools
Deliverable Name: Deliverable 4.2.2 – Technical Report on Best Practice Guidelines for casting and profiling Ecosystem Services management tools in European Outermost Regions and Overseas Countries and Territories
Due date of deliverable: December 2019
Actual submission date: August 2021
Dissemination Level: Public

This project has received funding from the European Commission Directorate - General Environment, under the grant 07.027735/2018/776517/SUB/ENV.D2

Document Information	
Document Name	Deliverable 4.2.2 – Technical Report on Best Practice Guidelines for casting and profiling Ecosystem Services management tools in European Outermost Regions and Overseas Countries and Territories
Citation	MOVE project (2020), European Commission Directorate General Environment Grant Agreement no. 07.027735/2018/776517/SUB/ENV.D2. Deliverable 4.2.2 – *Technical Report on Best Practice Guidelines for casting and profiling Ecosystem Services management tools in European Outermost Regions and Overseas Countries and Territories.*
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Dissemination level	Public

History			
Version	**Date**	**Modification**	**Author(s)**
1	February 2021	1st Draft Version	Lagabrielle UR
2	February 2021	Revision	FRCT, UoP
3	July 2021	2nd Draft Version	Lagabrielle UR
4	July 2021	Revion	LUH
5	August 2021	Final version	FRCT

Summary

This report aims to identify decision support tools (DSTs) for the mapping and assessment of ecosystem services (MAES), contributing to fulfilling the obligations of the EU Biodiversity Strategy to 2020 in European ORs/OCTs. This report profiles and casts a set of seven DSTs relevant to support the EU Biodiversity Strategy while fitting with the socio-ecological profile of Europe's OCTs/ORs. Those DSTs have complementary scopes in terms of ecosystem, sector and stage of ecosystem services (ES) management (from the screening to the planning stage). A time-phased combination of a DST for assessing and mapping ES with a DST to support spatial planning oriented toward ES with stakeholders is advised.

Publishable Summary

This report aims to identify decision support tools (DSTs) for the mapping and assessment of ecosystem services (MAES), contributing to fulfilling the obligations of the EU Biodiversity Strategy to 2020 in European ORs/OCTs. This report profiles and casts a set of seven DSTs relevant to support the EU Biodiversity Strategy while fitting with the socio-ecological profile of Europe's OCTs/ORs. Those DSTs have complementary scopes in terms of ecosystem, sector and stage of ecosystem services (ES) management (from the screening to the planning stage). A time-phased combination of a DST for assessing and mapping ES with a DST to support spatial planning oriented toward ES with stakeholders is advised.

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1. Introduction

In the MOVE project Deliverable D.4.2.1 – *Review of available Science policy interface tools* (MOVE project, 2020), was identified the principles and stakes of public participation in public decision-making, more specifically regarding spatial and environmental planning. I was also identified Decision Support Tools (DSTs) that could support ecosystem services (ES) public policies in general. This report aims to identify the most appropriate DSTs for ES public policies in Europe's OCTs/ORs, to contribute to fulfilling the obligations of the EU Biodiversity Strategy to 2020, and now the EU biodiversity strategy for 2030, a core part of the European Green Deal.

2. Policy challenges and ecosystem services in OCTs/ORs

Europe's nine European Outermost Regions (ORs) and 13 (25 before Brexit) Overseas Countries and Territories (OCTs) are mainly islands characterised by small surfaces (except French Guiana and Greenland) and isolation. Collectively, those territories encompass a population of some 6.1 million people and a land area of about 567,706 square kilometres (excluding Greenland). ORs are territories located at a long distance from continental Europe but make up substantial parts of EU Member State's territories (Sieber et al., 2018). ORs include the Azores, Madeira, Canary Islands and the French Overseas departments of French Guiana, Guadeloupe, Martinique, Saint Martin, La Réunion and Mayotte. The OCTs are islands located in the Atlantic, Antarctic, Arctic, Caribbean and Pacific regions, and one of them has no permanent population (Terres Australes et Antarctiques Françaises).

ORs and OCTs play a vital role as strategic outposts of the Union in the geographical areas where they are located. OCTs are associated with the European Union but remain constitutionally linked to three Member States (Denmark, France and the Netherlands). Unlike ORs, OCTs are neither part of the EU territory nor the EU single market. The OCTs have wide-ranging autonomy, covering areas such as economic affairs, employment market, public health, home affairs and customs. While defence and foreign affairs usually remain within the remit of the Member States (European Commission, 2020).

The socio-economic profiles of OCTs/ORs are characterised by rapid demographic growth associated with lower GNP per capita (compared to continental EU-member countries) (Marie and Rallu, 2012). Those trends are associated with a high unemployment rate (especially the younger generation), lower education performance, lower workforce skills, a lack of infrastructures and equipment in general (transport, communication, education, healthcare) and overall degradation of the environment. Indeed, ecosystems and associated services in most of the ORs and OCTs are degrading under the pressure and impacts of rapid land-use changes (partially uncontrolled urban sprawl and agricultural development), invasive alien species and climate change (Sieber et al., 2018).

In this context, a high stake for OCTs/ORs is to develop a specific model of sustainable growth and social cohesion. Indeed, OCTs and ORs receive specific policy measures according to the EU. The 'Treaty on the Functioning of the European Union' (Herefeter TFEU) (Art. 349) states that "the (EU) Council (…) shall adopt specific measures for ORs given that their remoteness, insularity, small size, difficult topography and climate, economic dependence on a few products, the permanence and combination of which severely restrain their development". Regarding OCTs, the TFEU states (Art.197-199) that the purpose of OCTs' association with EU shall be to promote their "economic and social development (…) to further the interests and prosperity of (their) inhabitants in order to lead them to the economic, social and cultural development to which they aspire". It also states that "the Member States shall contribute to the investments required for the progressive development" of OCTs.

Solutions to overcome degrading social-environmental trends and risks in OCTs/ORs include relevant long-term spatial planning strategies, application of the "rule of law" principle combined with improved skills/education and technological research and development. The EU Biodiversity Strategy to 2020 and in the EU Biodiversity Strategy for 2030, now a core part of the European Green Deal, identified those issues and solutions more specifically in Europe's OCTs/ORs. The BEST – a voluntary scheme for Biodiversity and Ecosystem Services in Territories of European overseas - has been designed and implemented since 2011 "to support the conservation of biodiversity and sustainable use of ES including ecosystem-based approaches to climate change adaptation and mitigation" in those territories.

Despite special aid from EU programs, degrading social and environmental trends in ORs and OCTs, are far from being reversed. In a recent study on climate-change adaptation policies, Magnan and Duvat (2018) showed that reversing or even stopping future vulnerability trajectories are a big challenge given the latency phenomena in social systems, particularly in insular systems. According to their study, this will require radical changes in the attitudes of decision makers and populations towards unavoidable environmental issues and the future. Indeed, environmental problems in OCTs/ORs remain poorly adressed due to a range of other "more urgent and more visible" socio-economic issues (transport, public health, unemployment etc.) that receive more attention from policy makers and policy implementers.

ES remain poorly known in OCTs/ORs. Sieber et al. (2018) assessed the current state of data and knowledge regarding the assessment of ES in OCTs and ORs. They conducted a systematic review of 161 (selected from 1030) scientific publications referring to ES mapping and assessment covering the ORs and OCTs. Most of the publications reviewed are investigations conducted in the European Caribbean (31%) and Pacific (21%) territories. This review showed that comprehensive national ecosystem assessments have already been provided by various EU member states, such as Spain, the Netherlands, France and Portugal in OCTs/ORs (see Sieber et al., (2018) for complete references). This study also found that spatial scales used to describe the individual ES in the publications were heterogeneous, with more than half of all reviewed publications referring to global and multi-national scales. Sieber et al. (2018) also highlighted the lack of standardised approaches and integrated assessments to map, assess and value ES on European OCTs and ORs.

In this context of heterogeneous knowledge and data, it is extremely difficult to convince policy makers to consider environmental issues and ES as a priority. Even when it is available, ES knowledge (and data) rarely serves as an "impartial arbiter" between policy options (Saarikoski et al., 2018). ES remain a concept that requires learning through close interactions between researchers, practitioners and stakeholders. To achieve this, we hypothetize that transparent, participatory methods using DSSTs can facilitate ES public policy uptake in European OCTs/ORs.

3. Casting DSTs for ecosystem services in OCTs/ORs

DSTs for ES mapping and assessment are assumed to contribute to well-informed decision-making to protect Europe's vulnerable overseas areas. We identified a set of criteria to select DSTs that best comply with the achievement of this objective in ORs and OCTs. To this purpose, we adjusted the criteria developed by Bagstad et al., (2013) and Grêt-Remarey et al., (2017) in order to address the socio-ecological profiles of ORs and OCTs. The result is an assessment framework made up of three groups of criteria. A simple scoring system was used (low or high performance or relevance, 0 or 1) to assess each criterion per DST.

The first group of criteria was developed by Bagstad et al., (2013): 1) Quantification and uncertainty, 2) Time requirements, 3) Capacity for independent application, 4) Level of development and documentation, 5) Scalability, 6) Generalizability, 7) Nonmonetary and cultural perspectives and 8) Affordability (Table 1).

Given the current context of ORs and OCTs, the DST should 1) be quantitative and spatially explicit, 2) involve low time requirements (for non-expert users), 3) be in the public domain, or with a purchasable software license, 4) have a good level of development and documentation, 5) fit for use at a local scale, 6) be generic ("one tool fits all"), 7) provide information that incorporates multiple valuation systems and 8) be affordable for institutions.

The second group of criteria refers to the sectors and the ecosystems "targeted" by the DSTs. These criteria were retrieved from the review by Grêt-Remarey et al., (2017). Since sectors and ecosystems are often redundant, we only used the sectors (i.e. Forest sector refers to forest ecosystem). We selected the following five sectors relevant to ORs and OCTs: 1) Agriculture and rural development, 2) Marine and coastal (including fisheries), 3) Spatial planning, 4) Conservation and protected areas, and 5) Multiple (combination of sectors).

The third group of criteria identified the relevance of DSTs for four stages of ES public policy stages (adapted from Bagstad et al., 2013): 1) screening, 2) mapping and assessment, 3) valuation and 4) planning and management (including stakeholder participation and policy uptake).

Out of the 68 DSTs listed in Grêt-Remarey et al., (2017), a subset of 9 DSTs, that matched the condition of long-term continuous development (>10 years) with the latest publication dating less than 5 years, was included in this assessement.

4. Results of Decision Support Tools (DSTs) casting for OCTs/ORs

The first group of DSTs that stands out from the application of DSTs selection criteria for OCTs/ORs are those addressing multiple objectives, sectors and ecosystems: InVEST, ARIES, MIMES and SolVES. Nevertheless, those tools fail to address the latest stage of (participatory) planning and management. The second group of DSTs addresses this phase of spatial planning and management: GEOMOD (designed to support spatial planning) and SeaSketch (initially designed for participatory marine conservation planning purpose). Those two types of DSTs should be used in combination with a complete sequence, starting from the assessement and mapping of ES up to the valuation and policy uptake.

The DSTs designed specifically for forest (exploitation) and agriculture and rural development (Daisy, CropSyst) are considered too specific in terms of ecosystem and sectoral coverage. However, they are relevant to support the mapping and assessment of ES in French Guiana or forest areas of insular OCTs/ORs.

Table 1: DSTs and assessement criteria for OCTs/ORs (adapted from Bagstad et al., (2013)).

Targeted sector or ecosystem when developing the DST	Agricuture and rural development		Marine and coastal	Conservation and protected areas	Spatial planning	Multiple			
DST name	Daisy	CropSyst	SeaSketch	MARXAN	GEOMOD	InVEST	ARIES	MIMES	SolVES
A. General assessment criterias (adapted from Bagstad et al. 2013)									
A1. Quantification and uncertainty	x	x	x	x	x	x	x	x	x
A2. Time requirements (lowest)			x	x	x	x			
A3. Capacity for independent application	x	x	x	x	x	x	x	x	x
A4. Level of development and documentation	x	x	x	x	x	x	x	x	x
A5. Scalability	x	x	x	x	x	x	x	x	x
A6. Generalizability	x	x	x	x		x	x	x	x
A7. Nonmonetary and cultural perspectives (monetary and non-monetary)			x						x
A8. Affordability	x	x	x			x	x	x	x
B. Relevant for sectors and ecosytems occcuring in Ors and OCTs (adapted from Grêt-Regamey et al., 2017)									
B1. Agriculture and rural development	x	x	x		x	x	x	x	x
B2. Marine and coastal (including fisheries)			x	x	x	x	x	x	x
B3. Spatial planning			x	x	x	x	x	x	x
B4. Conservation and protected areas			x	x	x	x	x	x	x
B6. Multiple			x		x	x	x	x	x
C. Relevant for specific ES management sequence (adapted from Bagstad et al. 2013)									
C1. Screening			x						
C2. Mapping and assessment	x	x		x	x	x	x	x	x
C3. Valuation (monetary and nonmonetary)						x	x	x	x
C4. Planning and management			x	x	x				

Hereafter, we describe the selected DSTs that best fit the socio-ecological profiles of OCTs and ORs (except those developed specifically for forest and agriculture and rural development). To our knowledge SeaSketch, MARXAN and InVEST were used in OCTs/ORs.

- **SeaSketch**

SeaSketch is an online platform (spatial data infrastructure and services) initially designed for marine spatial planning. Users of this commercial solution can launch a project by defining a study region, load map layers from existing web services, define "classes" such as prospective protected areas, transport zones or renewable energy sites. The non-expert user can make sketches that can be shared and discussed with other users in a chat linked to a forum map. SeaSketch is currently used to support marine spatial planning in more than 300 active projects worldwide (Burnett, 2020), including Califonia, where it was developed (Cravens et al., 2016). The tool was used within the MOVE project in Réunion Island (http://moveproject.reunion.seasketch.org/) and Azores (http://moveproject.azores.seasketch.org/). The marine spatial planning projects MarSP (Azores, Madeira and Canary), Ocean Metiss (Réunion) and Ordenamento do Espaço Marítimo dos Açores (Azores) also used the SeaSketch tool.

- **MARXAN**

MARXAN (Ball et al., 2009) is a free software initially designed to aid protected area design on conservation planning. With the use of optimisation routines, it generates spatial reserve systems that achieve particular biodiversity representation goals with reasonable optimality in terms of social and economic costs. MARXAN can be used in association with ArcGIS and QGIS software. The Wikipedia notice of MARXAN indicates that this tool is the most widely used decision-support software for conservation planning globally and has been used to build marine and terrestrial conservation systems covering approximately 5% of the Earth's surface, including European OCTs/ORs.

- **InVEST**

InVEST (Arcidiacono et al., 2015) is a suite of free, open-source software models developed by the Natural Capital Project and used to map and value the goods and services from nature that sustain and fulfil human life. Several studies have used InVEST across the world: 589 publications are listed on the website of the InVEST portal

(https://naturalcapitalproject.stanford.edu/software/invest). InVEST was used to assess ES in the Azores within the MOVE project (Sieber et al., unpublished). The output project maps can be seen here: http://moveproject.azores.seasketch.org/.

- **GEOMOD**

GeoMod (Pontius et al., 2001) is a raster-based land-use change modelling tool in the commercial GIS software TerrSet that simulates the gain or the loss of a land category over a specified time interval. The model simulates the spatial allocation of change between two land categories, either forwards or backwards, in time and can be used to assess the impacts of changes in terms of ES. In 2020, TerrSet announced the launch of the "Ecosystem Services Modeler", which provides 15 ecosystem service models based closely on the InVEST toolset developed by the Natural Capital Project (see above).

- **ARIES**

ARIES (Villa et al., 2014) is a web application meant to assess ES and their values to humans to facilitate environmental decisions and make them more effective. By creating ad-hoc, probabilistic models of both provision and usage of ES in a region of interest and mapping the actual physical flows of those benefits to their beneficiaries, ARIES helps discover, understand, and quantify environmental assets, and what factors influence their value according to explicit needs and priorities.

- **MIMES**

MIMES (Boumans et al., 2015) is an analytical framework designed to assess the dynamics associated with ES function and human activities. MIMES integrate diverse types of knowledge and elucidate how benefits from ES are gained and lost. In MIMES, users formalize how materials are transformed between natural, human, built, and social capitals. This information is synthesized within a systems model to forecast ES and human-use dynamics under alternative scenarios.

- **SolVES**

Social Values for Ecosystem Services (SolVES) (Sherrouse et al., 2016) is a tool to assess, map, and quantify nonmarket values perceived by various groups of ecosystem stakeholders. It integrates Maxent maximum entropy modelling software to generate more complete social-value maps from available value and preference survey data and produce more robust

models describing the relationship between social values and ecosystems.

5. Conclusion

This report was aimed to identify DSTs (for the mapping and assessment of ecosystems services) fitting with the socio-ecological profiles of Europe's ORs/OCTs, to contribute to fulfilling the obligations of the EU Biodiversity Strategy to 2020 in Europe's OCTs/ORs. This report profiled and cast a subset of seven DSTs relevant to support this strategy in OCTs/ORs. Those DSTs have a wide scope in terms of ecosystem, sector and stage of ES management (from screening to planning). A time-phased combination of a DST for assessing and mapping ES with a DST to support spatial planning oriented toward ES with stakeholders is advised. Given previous experiments developed in OCTs/ORs we advise the combined use of InVEST (for mapping and assessing, by scientists with stakeholders), possibly with MARXAN (for pre-exploring optimal planning solutions) and online spatial planning software such as SeaSketch (for sharing and negotiating spatial options with stakeholders).

In Annex 1, its provide the call for tender launched in the framework of the MOVE project (MOVE Activity 4, Deliverable 4.2.3) to profile, develop and use a decision support tool to operationalize spatial planning oriented towards ES in Réunion Island and the Azores. This document could support OCTs/ORs institutions to set up terms of reference for casting relevant DSTs for the mapping and assessment of ecosystems services.

6. References

Arcidiacono, A., Ronchi, S., Salata, S. (2015) Ecosystem Services Assessment Using InVEST as a Tool to Support Decision Making Process: Critical Issues and Opportunities. In: Gervasi O. et al. (eds) Computational Science and Its Applications -- ICCSA 2015. ICCSA 2015. *Lecture Notes in Computer Science*, 9158. Springer, Cham.

Bagstad, K.J., Semmens, D.J., Waage, S., Winthrop, R. (2013) A comparative assessment of decision-support tools for ecosystem services quantification and valuation. *Ecosystem Services*, 5, 27-39

Ball, I.R., Possingham, H. P., Watts, M. E. (2009) Marxan and relatives: Software for spatial conservation prioritization. Spatial conservation prioritization. Quantitative methods & computational tools. Edited by A. Moilanen, K. A. Wilson, and H. P. Possingham. United Kingdom: Oxford University Press. 185-195

Boumans, R., Roman, J., Altman, I., Kaufma., L. (2015) The Multiscale Integrated Model of Ecosystem Services (MIMES): Simulating the interactions of coupled human and natural systems. *Ecosystem Services*, 12, 30-41

Burnett, C. M. (2020) Incorporating the participatory process in the design of geospatial support tools: Lessons learned from SeaSketch. *Environmental Modelling & Software*, 127

Cravens, A.E. (2016) Negotiation and Decision Making with Collaborative Software: How MarineMap 'Changed the Game' in California's Marine Life Protected Act Initiative. *Environmental Management, 57*, 474–497

European Commission (2020) https://ec.europa.eu/international-partnerships/where-we-work/overseas-countries-and-territories_en

Grêt-Regamey, A., Sirén, E., Brunner, S.H., Weibel, B. (2017) Review of decision support tools to operationalize the ecosystem services concept, *Ecosystem Services*, 26, Part B, 306-315

MOVE project (2020), European Commission Directorate General Environment Grant Agreement no. 07.027735/2018/776517/SUB/ENV.D2. Deliverable 4.2.1 – Review of available science-policy interface tools and respective theoretical background. Available in: https://moveproject.eu/wp-content/uploads/2021/05/MOVE_D.4.2.1_Review-of-available-science-policy-interface-tools_FINAL-1.pdf

Magnan, A.K., Duvat, V.K.E. (2018) Unavoidable solutions for coastal adaptation in Reunion Island (Indian Ocean). Environmental Science & Policy, 89, 393-400

Marie, C.V., Rallu, P. M. (2012) Demographic and migration trends in the outermost regions: impacts on economic, social and territorial cohesion? Executive summary, INED European Union Regional Policy, 19 p. [On line] URL : https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/rup_migratory/ex_sum_rup_en.pdf

Pontius, R. G., Cornell, J. D., Hall, C. A. (2001) Modeling the spatial pattern of land-use change with GEOMOD2: application and validation for Costa Rica. Agriculture, Ecosystems & Environment, 85(1), 191-203

Saarikoski, H. Primmer, E. Saarela, S.-R. Antunes, P. Aszalós, R., et al. (2018) Institutional challenges in putting ecosystem service knowledge in practice. Ecosystem Services, 29, Part C, 579-598,

Sherrouse, B.C., Semmens, D.J., Clement, J.M. (2014) An application of Social Values for Ecosystem Services (SolVES) to three national forests in Colorado and Wyoming. Ecological Indicators, 36, 68-79

Sieber, I. M., Burkhard, B., Borges, P. (2018) Hotspots of biodiversity and ecosystem services: the Outermost Regions and Overseas Countries and Territories of the European Union. One Ecosystem. 3. 10.3897/oneeco.3.e24719

Villa, F., Bagstad, K.J., Voigt, B., Johnson, G.W., Portela, R. et al. (2014) A methodology for adaptable and robust ecosystem services assessment. PLoS ONE 9(3):e91001

ANNEX 1

DECISION SUPPORT TOOL TO SUPPORT SPATIAL PLANNING ORIENTED TOWARDS ECOSYSTEM SERVICES

Technical clauses

1. BACKGROUND

1.2. Ecosystem services

Ecosystems provide many so-called ecosystem services. The commonly accepted definition of ecosystem services is from the Millennium Ecosystem Assessment (MEA), which defines them as the benefits (well-being and health) that humans derive from ecosystems. Ecosystem services can be classified according to a hierarchical structure. We use the CICES (Common International Classification of Ecosystem Services) classification. The CICES recognizes three main categories of ecosystem services: supply services, regulatory services and cultural services. CICES describes them using a hierarchical structure with five levels (Section / Division / Group / Class / Type). Spatial planning oriented towards ecosystem services thus consists of assigning objectives for maintaining/restoring ecosystem services to the spatial planning process.

1.2. Spatial planning

Spatial planning is a public decision-making process aimed at establishing, through zoning of the spatial allocation of space uses, a sustainable organization of the land and marine space use. Spatial planning aims to implement a sustainable development strategy in geographic space. Spatial (sustainable) planning should be based on the following principles:

- Sustainability: balance between ecological, economic and social aspects.
- Consistency: integration of spatial scales, activity sectors and levels of governance.
- Evidence-based: rely on evidence and rational elements, if possible scientifically proven and recognizing the uncertainties
- Transparency: stakeholders are actively involved in the process.

To respect these principles, it is necessary to use new tools ensuring the use of reliable and shared data and knowledge, the transparency of debates and the highest possible participation of the stakeholders involved in the decision-making process. More specifically, the planning process should be structured in such a way that planners, stakeholders, decision-makers and the general public interact at the different stages of the planning process, namely:

1- A pre-planning phase
2- A planning phase
3- An implementation phase
4- A post-implementation phase

1.3. The MOVE project

The MOVE pilot project aims to involve political decision-makers, researchers and civil society in the development of methodologies for mapping and assessing the state of ecosystems and their services in ultra-peripheral regions and overseas countries and territories. A coordinated and synergetic approach is recommended to transform the constraints of dispersal and geographic and political isolation and fragmentation of knowledge bases into advantages. This will be done by pooling resources and building robust participatory tools. The project will start with an assessment of the state of the art of the EESC exercise (Cartography and Assessment of Ecosystem Services, in English: MAES Mapping and Assessing Ecosystem Services) in the participating overseas regions, and by the inventory and motivation of the human and material capacities present in each of them. The project will then choose as case studies two specific regions and a particular contribution on which to focus the work of a dedicated team of local experts, political decision-makers and members of civil society, brought together through the ORs and OCTs. In addition to producing a tangible contribution for the MAES exercise, this project aims to demonstrate the possibility and the added value of a bottom-up approach involving and strengthening local actors. The MOVE pilot project implements the project "Mapping and assessment of the state of ecosystems and their services in the outermost regions and the overseas countries and territories: establishment of networks and sharing of resources" of the Directorate General of the Environment (Directorate D Natural Capital) of the European Commission.

The project is organized into 6 activities (Note: EESC: Mapping and Assessment of Ecosystem Services)

- Activity 1- Project coordination and management
- Activity 2- Mobilize stakeholders to assess the state-of-the-art and prioritize contributions to the project

- Activity 3 - Knowledge sharing and information repository
- Activity 4 - Facilitating the EESC in the European overseas territories
- Activity 5- Describe an EESC strategic plan for the Overseas of the European Union
- Activity 6- Communication, dissemination and awareness

This contract is part of "Task 4.2 - Test and evaluate science-policy interface tools" of activity 4 of the MOVE project which aims to facilitate the EESC in the European overseas territories through collaborative approaches.

2. OBJECT OF THE CONTRACT

The purpose of this procedure is the implementation of a tool (online software) by a service provider who will be responsible for:

- The provision of a generic spatial planning aid tool oriented towards ecosystem services with the various functionalities described in more detail below
- The online publication of the tool on the project site
- Advanced developments of the tool
- Tool maintenance.

3. EXPECTATIONS

To support the spatial planning process oriented towards ecosystem services, the (identify institution) wishes to acquire an online Geographic Information System tool allowing stakeholders (users) to negotiate a zoning of the space online, in a transparent manner, based on updated information.

The geographic areas concerned are (identify areas).

On an operational level, this tool used within the framework of the MOVE project must make it possible to achieve the following objectives:

- Identify priority areas for the spatial planning of ecosystem services,
- Anticipate risks and threats to the sustainability of ecosystem services (ecosystem-society interactions),
- Establish proposals for multi-activity spatial zoning with stakeholders in the management of territories and resources,
- Negotiate a spatial plan for spatial management oriented towards ecosystem services.

This tool must be accessible online and must offer:

- A data visualization interface (spatial, digital and textual data).
- A graphical input interface for zoning proposals
- A discussion forum linked to the data visualization tool and the graphical input interface for zoning proposals
- An interface allowing to configure and launch an online geographic survey
- Analysis reports automatically generated from the data entered on the tool
- A user interface allowing the administration of the tool by the team in charge of project management.

4. DESCRIPTION OF THE EXPECTED FUNCTIONALITIES

The 2000s saw the democratization of spatialized data, in particular via the Internet. Web mapping has become the norm. Today we are in the context of integrating geographic information into a larger information system. We are talking about Spatial Data Infrastructure that enables communication and exchanges between data producers and users.

The participatory spatial planning support tool should integrate information from these compatible Spatial Data Infrastructures. It should allow the harvesting, display and analysis of data from different sources and formats.

The tool should allow the sharing of geographic information between different actors according to sharing methods controlled by the project team.

The tool should also allow the creation of new geographic information from zoning proposals or from online surveys of users.

The tool will generate summary reports from the mass of collected data readable by the project team and by users, in particular, to compare different spatial zoning proposals (defined as scenarios).

Finally, the tool should allow the project team to monitor its use by the different categories of users.

4.1. Basic functionality

4.1.1. Principles of spatial data integration

In order to guarantee the interoperability of the spatial information of stored and produced data, the application must be able to handle spatial data of vector and raster type, at least, in the following formats:
- Raster data: Geotiff.
- Vector: Shapefile.

In addition, the application must be able to harvest data flows published according to the following OGC standards (at least one of the versions per flow standard).

The OGC (Open Geospatial Consortium) is an international organization in which more than 300 commercial, governmental, associative organizations and research laboratories wordlwide participate. Its members develop and implement standards for geospatial services and content, GIS data processing and interchange formats.

An increasing number of specifications describing geographic data models are being developed by the OGC to serve specific needs in situations requiring interoperability and geospatial technologies, including GIS. Additional information can be found at http://www.opengeospatial.org/.

4.1.2. Management of users and user groups

The application must allow the management of users (creation, acceptance, revocation) and access rights to different content based on user profiles (default rights assignment, modification of rights) and group profiles (creation, deletion, modification, assignment of rights).

For each user profile or user group, the rights to be defined will be:
- Reading rights.
- Writing rights.
- Modification rights.

The user groups will be for example:
- Group: Anonymous users.
- Group: Registered users.
- Group: "Stakeholder" users (fishing sector, tourism sector, etc.)
- Group: Project team.
- Group: Administrator of the application

4.1.3. Spatial data visualization features.

The application must allow visualization of the geographic information integrated into the application. The tool should also allow the addition of information from data sources external to the application.

Conventionally, a spatial data visualization module must make it possible to organize spatial information into layers of information:
- Information layers integrated into the application:
    - The basic information layer is a basemap. The application will have to offer several (satellite image, OpenStreetMap, etc.).
    - The visualization module should also make it possible to search in the information layers integrated into the application to select them and thus add them to the visualization.
- Information layers external to the application: the application must allow the addition of external data sources in the form of data flows conforming to OGC standards (cf. Principles of spatial data integration).

For each layer of information, the user authorized to view the data concerned can modify the layer's opacity. If provided in the information layer, the user can select the most suitable layer symbology. Finally, the viewer must display a localization aid (geographic scale, indication of geographic north, geographic coordinate system markers).

All the visualizations thus configured by the user (background layer, layers of information with their symbology, help with localization) must be shareable (context file, export as an image), including on social networks under certain conditions.

4.2. Features allowing stakeholder participation

4.2.1. Zoning proposal module

The tool will include a zoning proposal module. The zoning proposal will take the form of classic vector geographic objects (points, lines, multi-lines, polygons) and attribute data produced online by the logged in and registered user.

To support the zoning proposal process, the tool should allow the development of classes of pre-configured geographic objects (attribute list and attribute modality under controlled or uncontrolled vocabulary).

The zoning proposal module must be connected to the Forum (cf. Forum module below). Thus, each zoning proposal may correspond to a publication (associated with a subject) in the Forum.

Alerts may be sent by notification (email) to users if their area of interest is subject to a zoning proposal, or if their zoning proposal is the subject of a comment or an alternative proposal.

4.2.2. Survey module

The tool should make it possible to carry out surveys in the form of questionnaires to collect various types of information. The types of responses to the questionnaires should be at least of the form:

- Multiple choices;
- Check boxes;
- Drop-down list;
- Short answer.

The design of the survey questionnaires must be feasible by the members of the project team (possibility of assistance by the service provider). Typical surveys could be, for example:

- Assessment of ecosystem services: surveys designed to collect information on the location and relative value of ecosystem services
- Data assessment: surveys designed for a technical audience, such as scientists, who are asked to assess geospatial information and to identify data gaps or problems.
- Plan assessment: During the different phases of the planning process, stakeholders may be asked to assess a set of plans (for example, those approved by a body, including the stakeholders themselves) as "Draft" before proceeding to the next step.

4.2.3. Forum module

A forum is a discussion space where users can exchange, through messages, on various subjects.

The tool must integrate a forum engine allowing administrators to manage forums (creation, deletion, moderation a priori or a posteriori) on the following categories:

- Forum: space made up of categories and sub-forums.
- Category: space grouping sub-forums.
- Sub-forums: space in which it is possible to post a subject.
- Subject: space in which a member can post a message.
- Sticky topic: An important discussion of the forum highlighted by an administrator or by a moderator for a given period.
- Locked subject: Subject where you can no longer post.

- Topic posted and locked: Important discussion closed, often the rules of the forum.
- Announcement: Often used for rules in forums, announcements are used for one-off or long-term events to pass information to the community.
- General announcement: this is an open and highlighted discussion on all forums.

Each category of the forum may be made accessible to certain users or user groups.

The content managed by the platform (data visualization, zoning proposal, survey module) must be able to be integrated into forum messages (see Spatial data visualization functionalities, Zoning proposal module).

The Forum module must be connected to the zoning proposal module. Thus, a post (associated with a subject) in the Forum can be associated with a zoning proposal.

4.3. Functionality of analysis reports.

4.3.1. Spatial content analysis.

The tool should allow a synthetic analysis, in the form of reports, of the spatial zoning proposed by the stakeholders, to guide the choice of planning zoning options. This analysis could take the form of geospatial modelling aiming to evaluate by scores the advantages and disadvantages of each zoning proposal (or set of zoning proposals).

4.3.2. Analysis of participation in the planning process.

The tool should allow a synthetic analysis of stakeholder participation in the form of reports by the project team, following European regulations in force (including the General Data Protection Regulation and the INSPIRE directive).

- Forum content must be downloadable and crawlable, providing a comprehensive database of user comments and publicly shared zoning proposals.
- The tool must quantify stakeholder engagement, including the number of connections, messages, zoning proposals and survey activities.

4.4. Administration of the tool.

The application must offer a "back office" only visible and accessible to users with the administrator profile of the application (see Managing users and user groups).

The back office should allow the administration of all of the application's functionalities:

- Integration of spatial data (cf. Principles of integration of spatial data).
- User and group management (see User and user group management).
- Creation of sets of crossed layers ready for visualization (cf. Spatial data visualization functionalities).
- Management of pre-configured classes of geographic objects (cf. zoning proposal)
- Management of forums (cf. Forum module).
- Management of surveys (cf. Survey module).

5. CONDUCT OF THE SERVICE

The service will start from (identify date)

5.1. Pre-planning phase

Duration two weeks

Data on ecosystem services are organized and represented (legend) for a first presentation to stakeholders and the general public.

Administrators create feature classes and discuss potential goals and objectives to create an initial draft zoning proposal (planning elements,

such as areas), analyzes and reports (i.e. which helps users determine the consequences of zoning).

5.2. Initial planning phase.

Duration two weeks

Stakeholders receive training in the use of the application.

Stakeholders review the data and, using the application forums (see Forums functionality), perform a second round of data assessments to identify gaps in existing data.

Stakeholders respond to geospatial surveys to provide information on the distribution of resources and valued natural features (see Survey Module).

Stakeholders agree on the goals and objectives of the planning initiative, and these are codified into sketch classes, analyzes and reports.

5.3. Planning phase.

Duration six months (use of the tool)

All participants in the process are presented with an authoritative database (set of geospatial data layers), characterized by evolution and yet by the "best available data" required to start planning.

Stakeholders sketch, evaluate, share and collaboratively develop prospective zoning options in three or more iterations. In each case, the options are shared (in groups, sub-groups or publicly) with the intention of developing a common vision of the marine spatial plan (i.e., if possible, by consensus).

Data visualizations, analyzes and reports are considered evolving elements. As the goals and objectives are refined, so are these tools.

The project team periodically submits the plans for review to a monitoring committee.

The project team and the monitoring committee verify that the stakeholders adhere to the intention of the maritime spatial planning process (the project mandate), to its goals and objectives.

Periodic meetings are held to increase the awareness and contributions of the general public to the maritime spatial planning process by using the tool to display information and understand the zoning process.

6. SERVICES

6.1. Programming requests

The selected service provider must be able to provide advice and services on the development of the tool:

- If new functionality requirements are identified (for example, offline functionality), these functionalities can be specified, extended and designed with adequate funding.

- If new software tools are needed (mobile applications, web applications, for example), they can be specified, extended and designed with adequate funding.

The response to this present market will have to include a possibility of requesting basic programming. This quantity must be subject to an estimate.

6.2. Regular Service, Maintenance and After Sales Service Verification

The Regular Service Check (VSR) will be spread over ten weeks. During this time, the project team will ensure that the service delivered by the provider meets the expectations.

A maintenance period of six months, excluding development needs, is to be expected to ensure the stability in the medium term.

Finally, the service provider can be contacted over a period of two years after the end of the maintenance period in the event of instability of the device or major bugs blocking the use of the tool.

6.3. Training

Training in the use and administration of the tool is required. This training will be for MOVE project staff, the tool operators and the future site administrator(s). This training should help achieve autonomy in the administration, maintenance and updating of the web application.

The place and the modalities of the course will be defined during the project launch meeting. The technical documentation related to this training will be provided in the course of it.

7. TECHNICAL AND GRAPHICAL CONSTRAINTS

7.1. Continuity of operation

The various components of the application must be accessible online 24 hours a day and 7 days a week via a service whose accommodation will be organized as part of the service by the holder. The expected peaks of use will be during the day, between 4:00 and 15:00 GMT.

A one-day interruption tolerance is acceptable since most MOVE project products are not intended for "real-time" applications. In addition, the internal catalogues already existing can be used as a backup in the event of a temporary interruption.

7.2. Graphic constraints

The tool must allow the display of the MOVE project logo, the funders and the project partners.

8. EXPECTED DELIVERABLES

At the end of the contract, the service provider should deliver the following:

- The web portal developed according to the specifications of this document;
- A document enabling operators and managers to take charge of the proposed solution and ensure its maintenance;
- Training on the administration of the portal (maintenance, supply of databases, updating);

The candidate will clearly indicate in his response any additional deliverables he proposes to associate with each implementation phase.

9. TERMS OF THE RESPONSE TO THE FILE

The tenderer will provide a complete file in a digital copy. This file should describe the characteristics of the proposed solution responding to all the points specified in these technical clauses and imperatively respecting their scheduling.

The service provider should provide a schedule of operations and deadlines for each stage of the entire execution of the contract.

The tenderer may attach to this file any information it deems useful to facilitate the understanding of its offer.

10. PRESENTATION OF PRIZES

Price offers must include various taxes (VAT, dock dues, ...) and shipping costs to the xxxx.

The total, free of all taxes and shipping costs, will be clearly indicated for each part of the proposal (hardware, software, services). The prices will be expressed in euros.

The delivery and completion times will be clearly specified.

The answer must clearly determine the limits of the benefits.

The service provider must quantify all the services by detailing the activities for the successful completion of the project.