MESMA:
An integrated tool box to support an ecosystem based spatial management of marine areas

Stelzenmüller, V., Stamford, T., Vassilopoulou, V., Kastanevakis, S., Vincx, M, Vanaverbeke, J. , Rabaut, M. , van Dalfsen, J., Cronin, K., Sutton, G., Essid, M., Jones, P.J.S., Qiu, W. , Bos, O. and van Hoof, L.

EU FP7 project 2009-2013

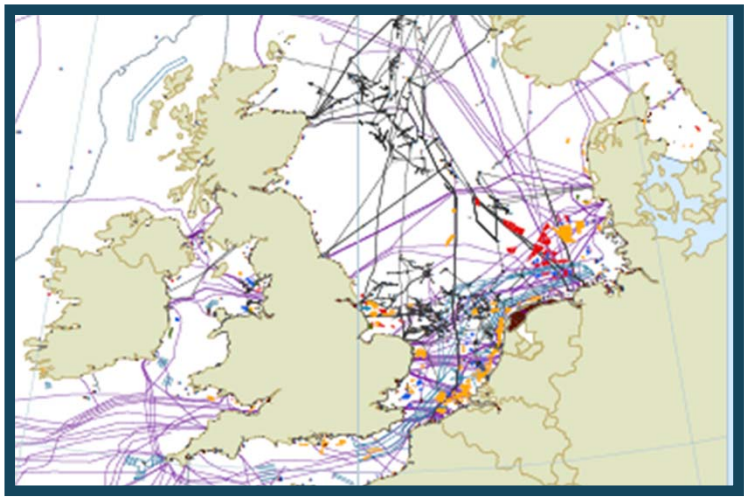
www.mesma.org

Human use of EU seas increases

- shipping
- fisheries
- gas / oil industry
- nature conservation (Natura 2000)
- aquaculture

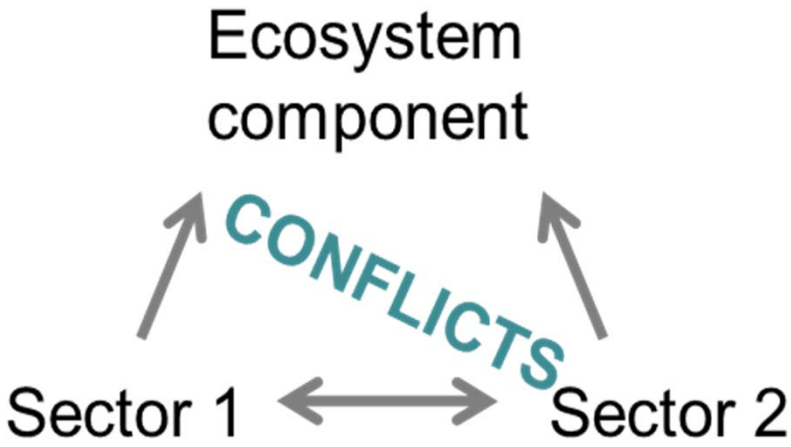
- off shore wind farms
- mining
- sand extraction
- recreation

Monitoring and Evaluation of Spatially Managed Areas



Spatial distribution of human activities in the North Sea

How do we balance economic and environmental interests?



Marine spatial planning (MSP)

Place-based management as a tool implement an ecosystem approach to marine management
(Olsen et al. 2010; Katsanevakis et al. 2012)

MSP allocates spatial and temporal distribution of human activities in marine areas **to achieve ecological, economic, and social objectives**

Fig.1: The Integrated MSP process
Source: PlanCoast Handbook on IMSP
www.plancoast.eu

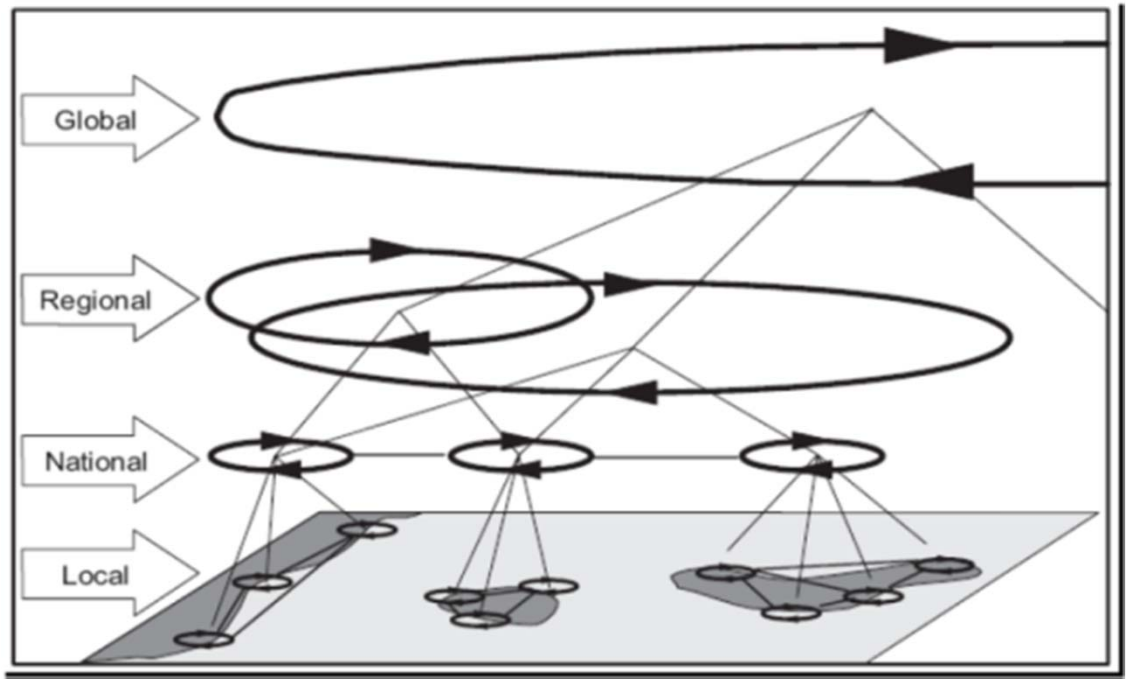
How can we evaluate the effectiveness of spatially managed areas in Europe?

2009-2013
21 partners
8.5 million Euros

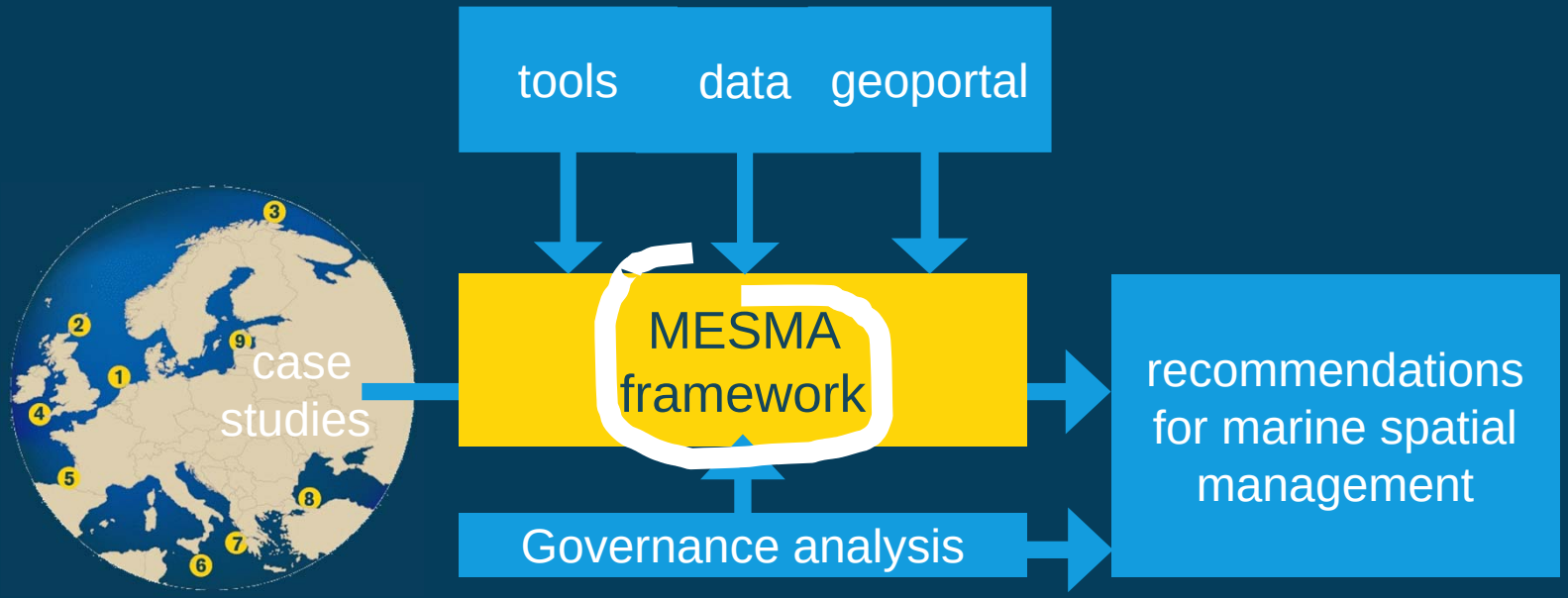
SEVENTH FRAMEWORK PROGRAMME

Aim of MESMA:

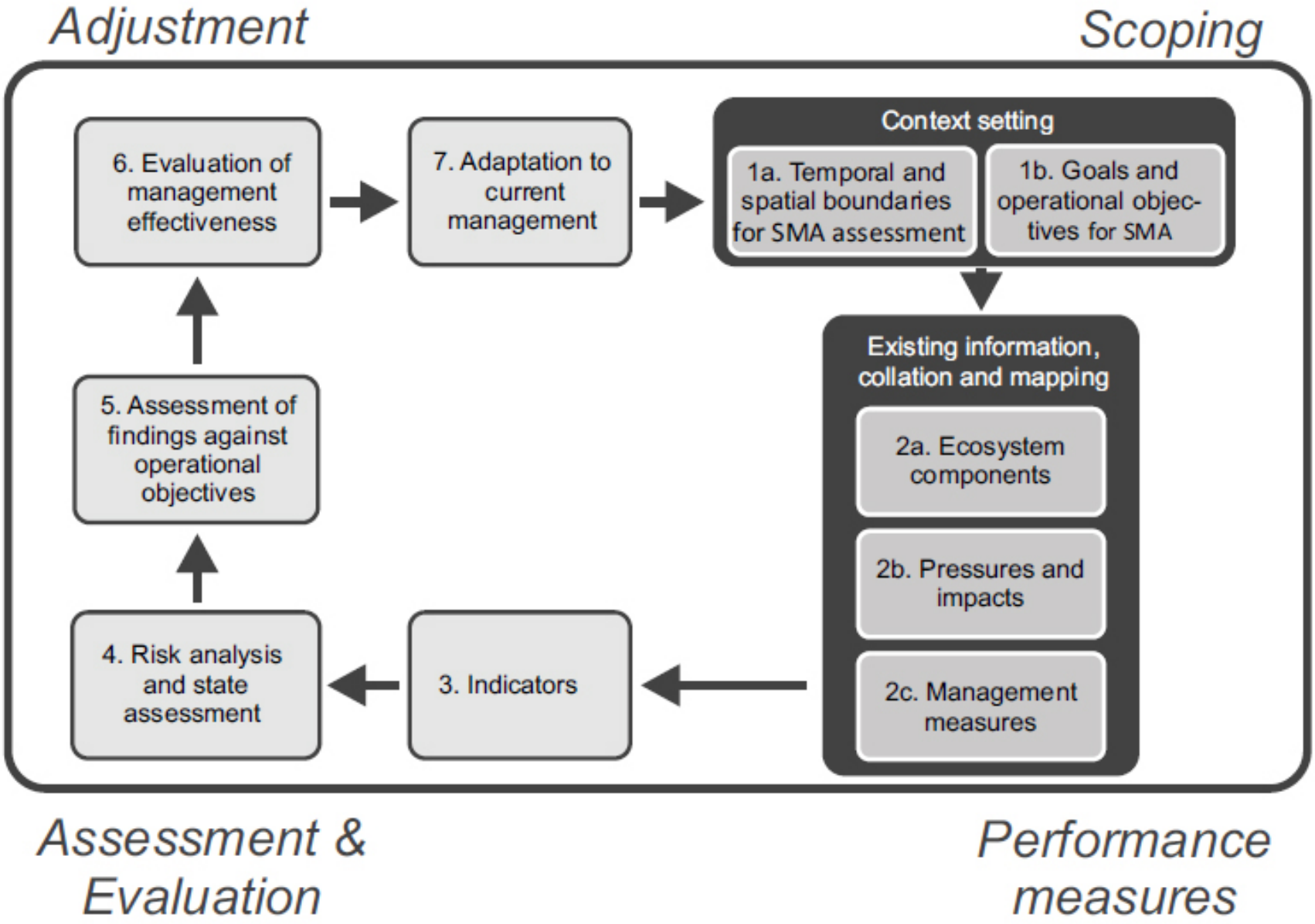
produce an integrated and flexible management tool box (concepts, models and guidelines) for monitoring and evaluation of spatially managed areas (SMA) at different scales (local, national, regional)



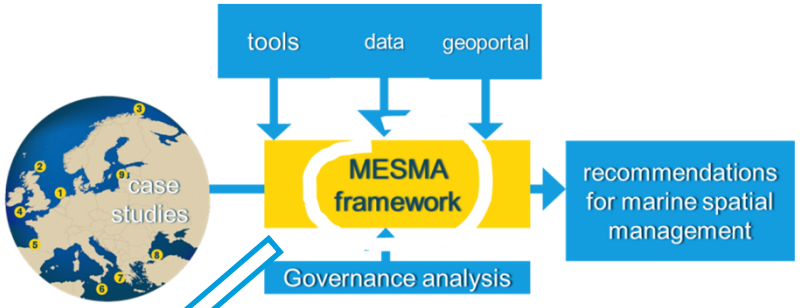
MESMA framework at the heart of the project



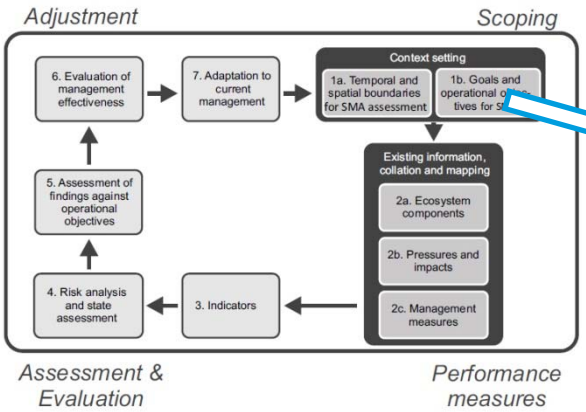
MESMA Framework



Applying the MESMA framework



framework



manual

Assessment of SMAs

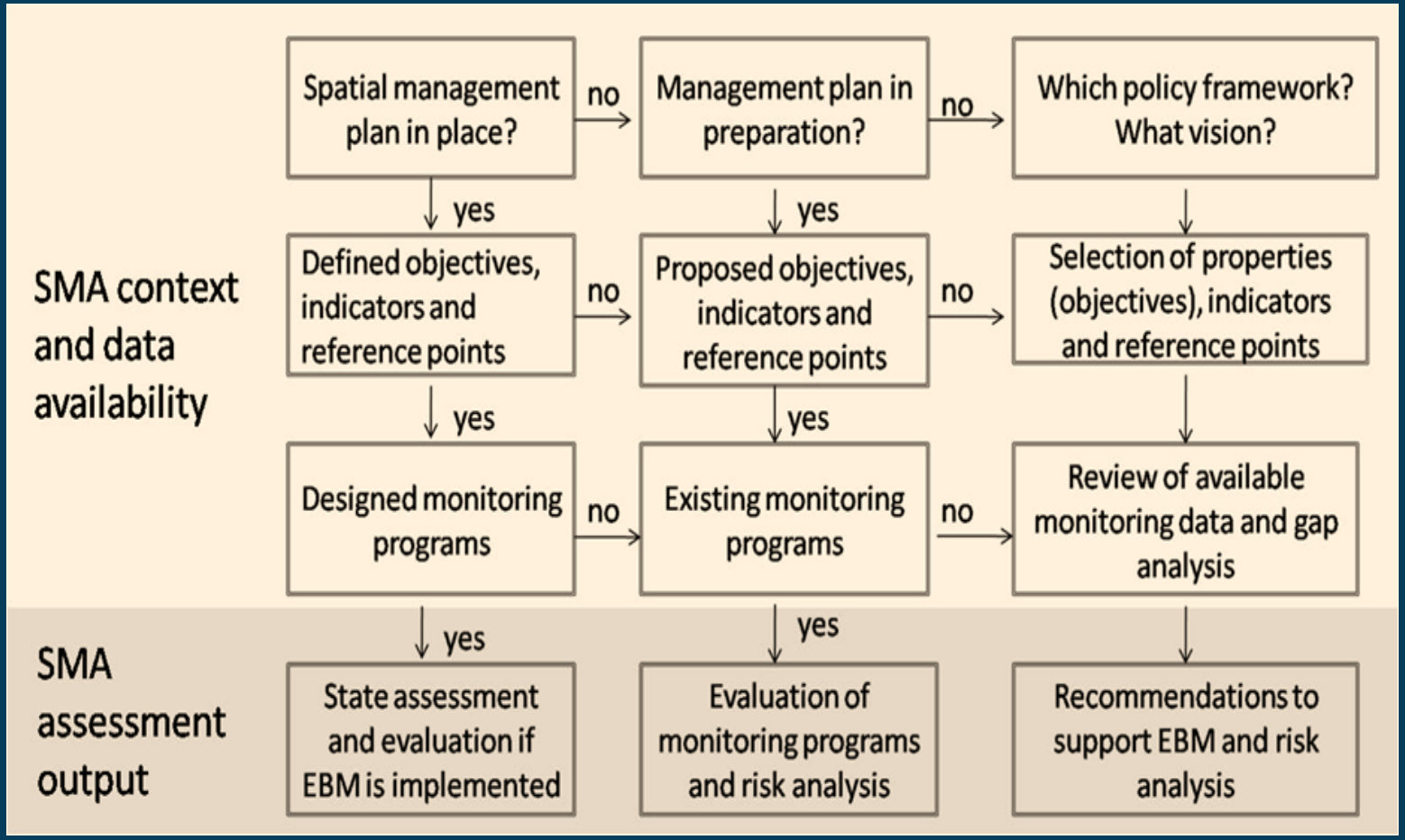
Spatial management plans

yes

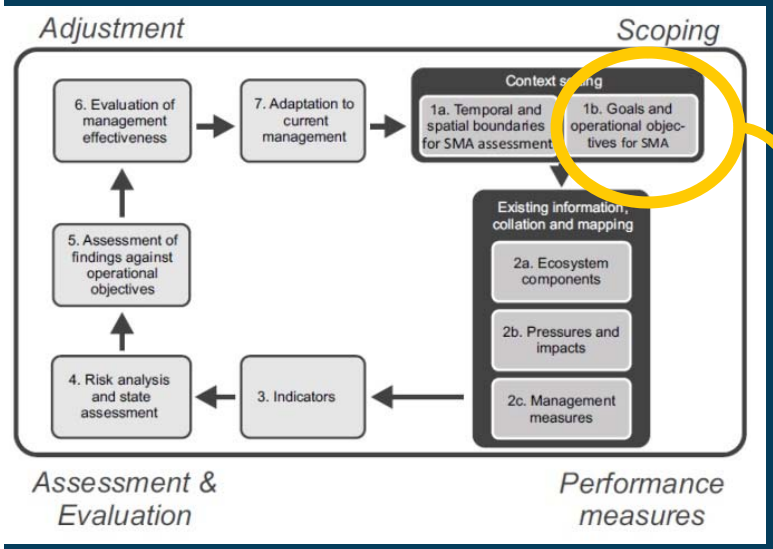
in progress

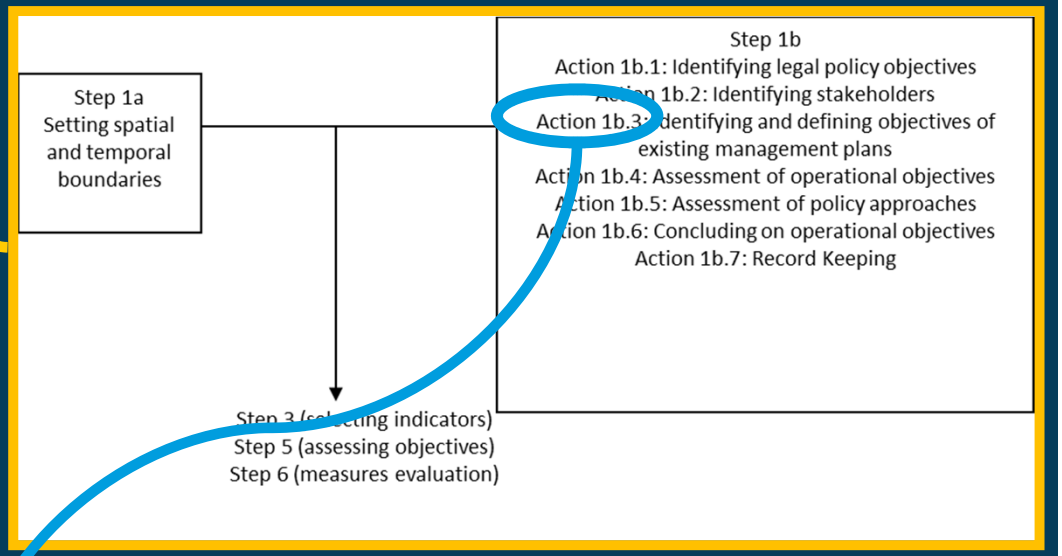
no

MESMA framework: pre-assessment of possible outputs



Framework manual: Step 1b example





Action 1b.3 Identifying and defining objectives of existing management plans

Using the list of management plans under action 1a.1, complete the table below with information regarding their objectives. Categorise objectives into socio-economic, ecological or mixed/other objectives. You may wish to draw on information from the governance analysis to complete this action; the balance between ecological and socio-economic objectives will be evaluated through the WP6 governance analysis, which draws on institutional settings and the views and perspectives of stakeholders with an interest in the SMA.

Where there are no proposed management plans or management plans in place, move straight to action 1b.4.

Table 1b.3. Objectives of existing management plans.

Plan name*	Plan objectives	Are the objectives ecological / socio-economic / mixed / other?	Area for which the objective is relevant (whole region / part of the region)	Objective deadline	Conflicts between other management plans / objectives

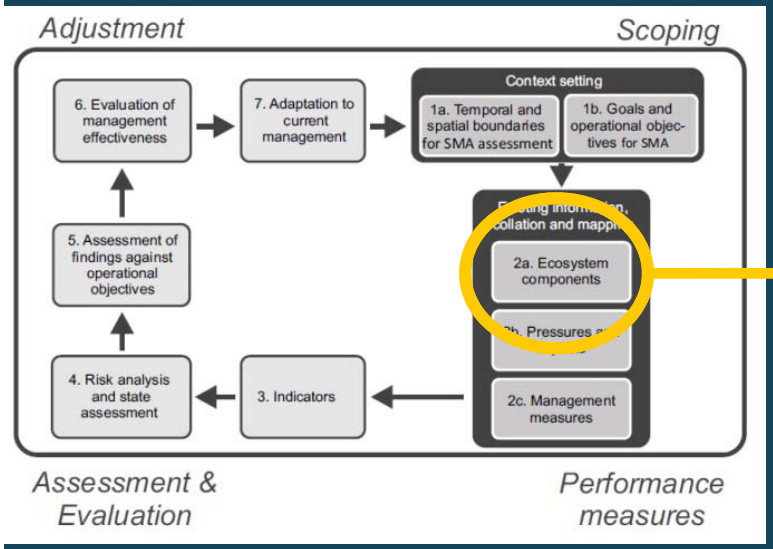
Monitoring and

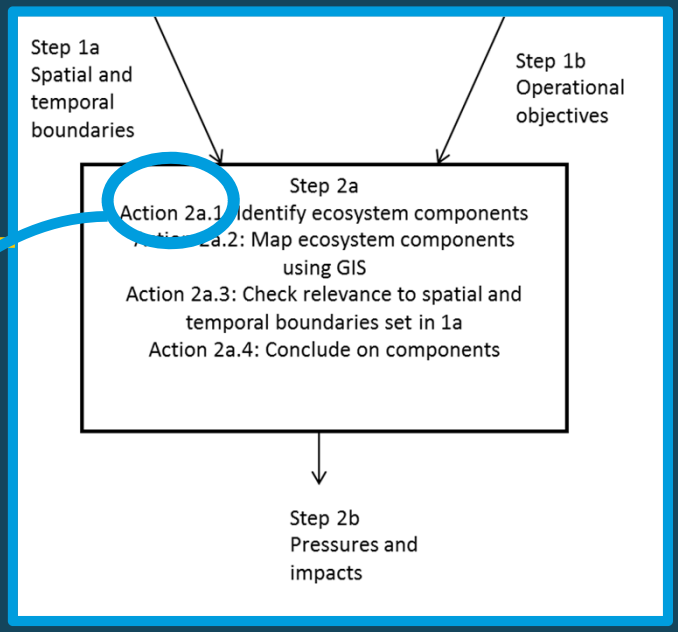
Framework manual: Step 1b example

Table 2: Examples of conventions and directives that apply in the study area, with their high-level and operational objectives.

Convention/Directive	High-level objectives	Operational objective
International Convention on Biological Diversity Text of the CBD(1992). http://www.cbd.int/convention/text/ Accessed online 18/01/2011	To conserve biodiversity, promote the sustainable use of the components of biodiversity, and the fair and equitable use of genetic resources.	To achieve by 2010, a significant reduction on the current rate of biodiversity loss at the global, regional and local scale.
European Marine Strategy Framework Directive European Council, (2008), Criteria and methodological standards on good environmental status of marine waters, (EU COM 2010)	To protect, conserve and, where possible, restore the marine environment in order to maintain biodiversity and provide diverse and dynamic oceans and seas which are clean, healthy and productive	To achieve 'good environmental status' in Europe's regional seas by 2020, according to a set of 11 descriptors and a relevant list of indicators.
European Habitats Directive European Council, (1992)	'To promote the maintenance of biodiversity', and to contribute to the general objective of sustainable development.	To maintain or restore the natural habitats and the populations of species of wild flora and fauna at a favourable conservation status, according to a specific set of criteria. To set up a coherent European ecological network of special areas of conservation, under the title of Natura 2000.
European Common Fisheries Policy European Commission, (2009)	The protection of fish stocks in European waters against overfishing; a guaranteed income for fishermen; a steady supply at reasonable prices for consumers and the processing sector; and the sustainable biological, environmental, and economic exploitation of living aquatic resources	Integrating environmental concerns into fisheries management to ensure the sustainability of fisheries, and using the principle of maximum sustainable yield (MSY) for stock management. Increasing stakeholder involvement and compliance through the establishment of Regional Advisory Councils.
European Water Framework Directive European Council, (2000)	The protection and enhancement of aquatic systems; the promotion sustainable water use; the progressive reduction and full elimination of discharges and emissions of harmful substances and pollution into aquatic resources; and the mitigation of the effects of floods and droughts.	To achieve by 2015 'Good ecological and chemical status' in all surface and groundwater bodies.
European Birds Directive European Council, (2009),	To conserve and protect birds which naturally occur in the Union and their habitats.	Maintain the population levels of bird species which correspond to ecological scientific and cultural requirements. The establishment of a coherent network of Special Protection Areas comprising all relevant and suitable territories of bird species which naturally occur in the Union.

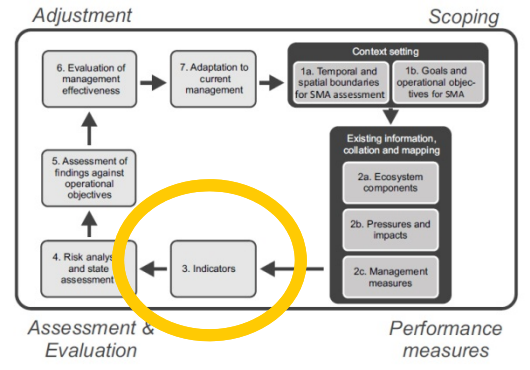
Step 2a: identify ecosystem components





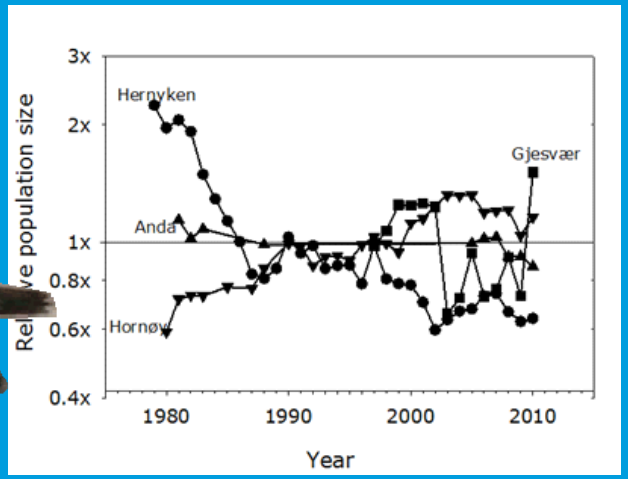
1. Type	2. Ecosystem component	3. Reference	4. Relevant objective(s)	5. Spatial coverage (good/poor)	6. Temporal coverage (good/poor)	7. GIS Layer File Name
Physical and chemical	Topography and bathymetry of the seabed					
	Temperature regime, current velocity, upwelling, wave exposure, mixing characteristics, turbidity and residence time					
	Salinity					
	Nutrients					
	Marine acidification					
Habitat types	Predominant habitat types					
	Special habitat types					
	Identification of habitats in special areas					
	Biological communities including phytoplankton and zooplankton communities					

Example applications: Step 3 - Indicators



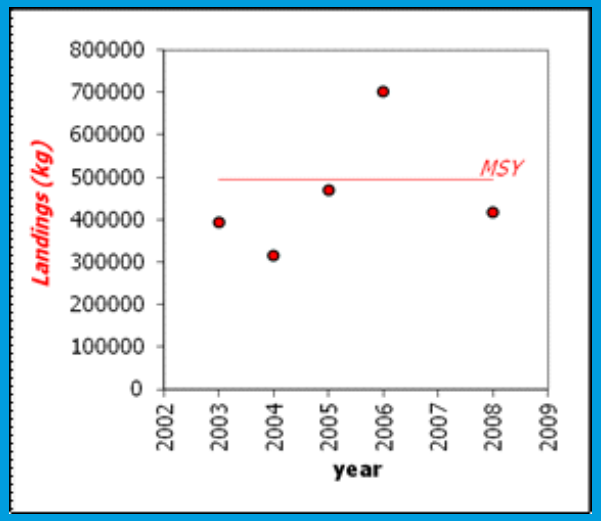
Barents Sea Case Study

- Puffin population as "state" indicator for several Barents Sea Management Plan objectives

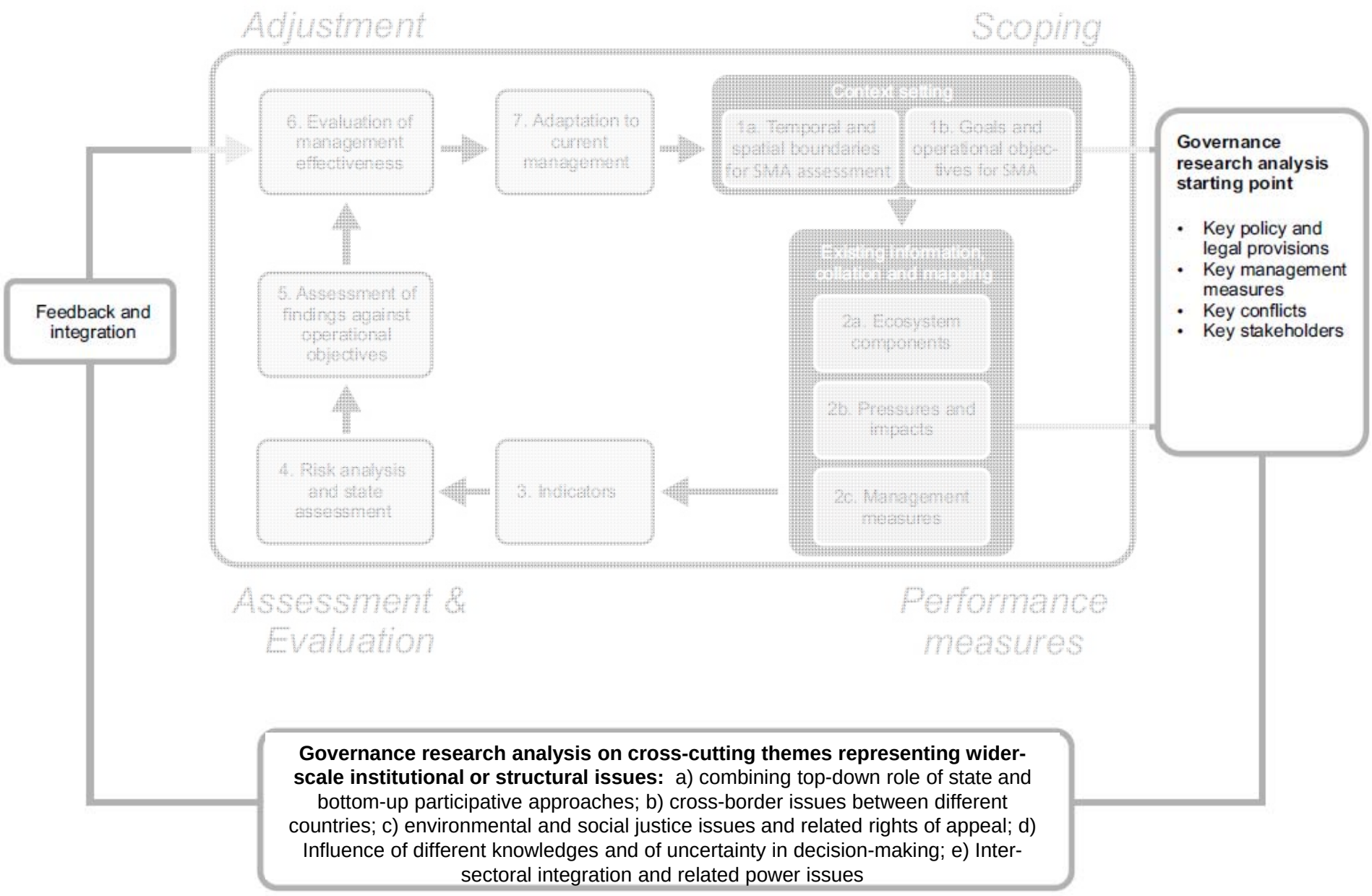


Inner Ionian Archipelago Case Study

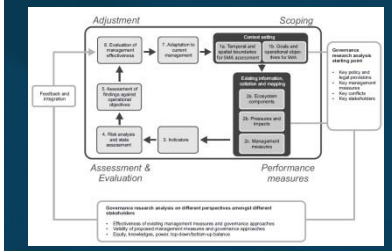
- Hake (*Merluccius merluccius)* landings as a "pressure" indicator to evaluate the achievement of the operational objective of a sustainable exploitation of the resource in the Inner Ionian Archipelago



Parallel governance analysis



Parallel governance analysis



- to assess how to effectively combine top-down, bottom-up and market approaches to marine spatial planning

Table 1: Structured and systematic guidelines for governance research comprising seven sections that have been developed for implementation in each case study.

Section	Contents
I	Context: Description of the socio-economic and political context, and the regional policy framework (e.g. regional sea management plans)
II	Objectives and management measures: Identification of a priority objective and secondary objectives for the evaluation of governance approaches, and the associated legal and policy framework.
III	Conflicts: Description of conflicts between environmental conservation and resources use, as well as between sectors or resource users
IV	Governance approach and effectiveness: Description of the main governance approach employed (top-down, decentralised, bottom-up, or market-based), and its effectiveness in achieving the priority objective and addressing related conflicts
V	Incentives: Description of the incentives implemented to encourage behavioural changes to fulfil the priority objective and to address related conflicts, as well as a discussion of the incentives needed to improve governance
VI	Cross-cutting themes: Discussion of five cross-cutting themes representing wider-scale institutional or structural issues that may underpin the effectiveness of individual incentives and/or the overall governance approach; a) combining top-down role of state and bottom-up participative approaches; b) cross-border issues between different countries; c) environmental and social justice issues and related rights of appeal; d) Influence of different knowledges and of uncertainty in decision-making; e) Inter-sectoral integration and related power issues
VII	Conclusion

Lessons learned from the cases studies

Challenges in integrating the MESMA framework and governance analysis:

The framework stream		Governance stream
Building on large datasets	⟷	Building on diverse perspectives
Applying quantitative analysis	⟷	Applying qualitative analysis
Taking a prescriptive and reductive research approach	⟷	Taking a realist and open research approach
Developing tools for scientific evaluations	⟷	Developing guidelines for policy making

- divergence of the assessment and research scope
- mismatch in scale
- difficulties in selecting a common objective

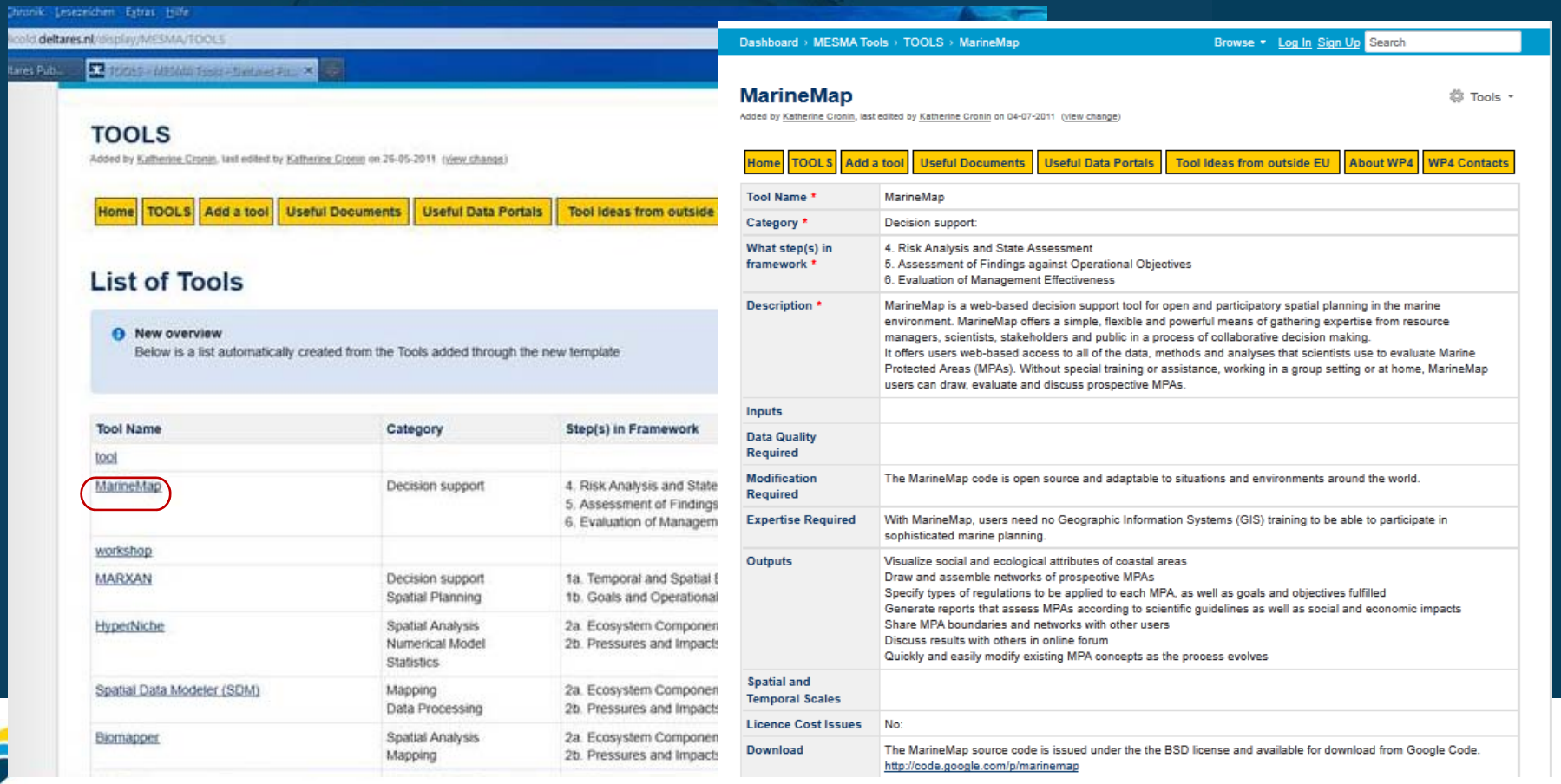
General challenges:

- Definition of overarching objectives and related operational objectives for SMAs with spatial management plans for subareas
- Access and availability of data and difficulty in identifying common operational objectives for transnational cases

Stelzenmüller et al. (in press). Monitoring and evaluation of spatially managed areas: A generic framework for implementation of ecosystem based marine management and its application. Marine Policy

Tools for framework steps

- Inventory of tools is available
  http://publicwiki.deltares.nl/display/MESMA/Home
- Tools are tested and evaluated
- Methodology for tool evaluation is under development



TOOLS

Added by Katherine Cronin, last edited by Katherine Cronin on 26-05-2011 (view change)

Home | TOOLS | Add a tool | Useful Documents | Useful Data Portals | Tool ideas from outside

List of Tools

New overview
Below is a list automatically created from the Tools added through the new template

Tool Name	Category	Step(s) in Framework
tool		
MarineMap	Decision support	4. Risk Analysis and State 5. Assessment of Findings 6. Evaluation of Managem
workshop		
MARXAN	Decision support Spatial Planning	1a. Temporal and Spatial E 1b. Goals and Operational
HyperNiche	Spatial Analysis Numerical Model Statistics	2a. Ecosystem Componen 2b. Pressures and Impacts
Spatial Data Modeler (SDM)	Mapping Data Processing	2a. Ecosystem Componen 2b. Pressures and Impacts
Biomapper	Spatial Analysis Mapping	2a. Ecosystem Componen 2b. Pressures and Impacts

Dashboard › MESMA Tools › TOOLS › MarineMap Browse Log In Sign Up Search

MarineMap

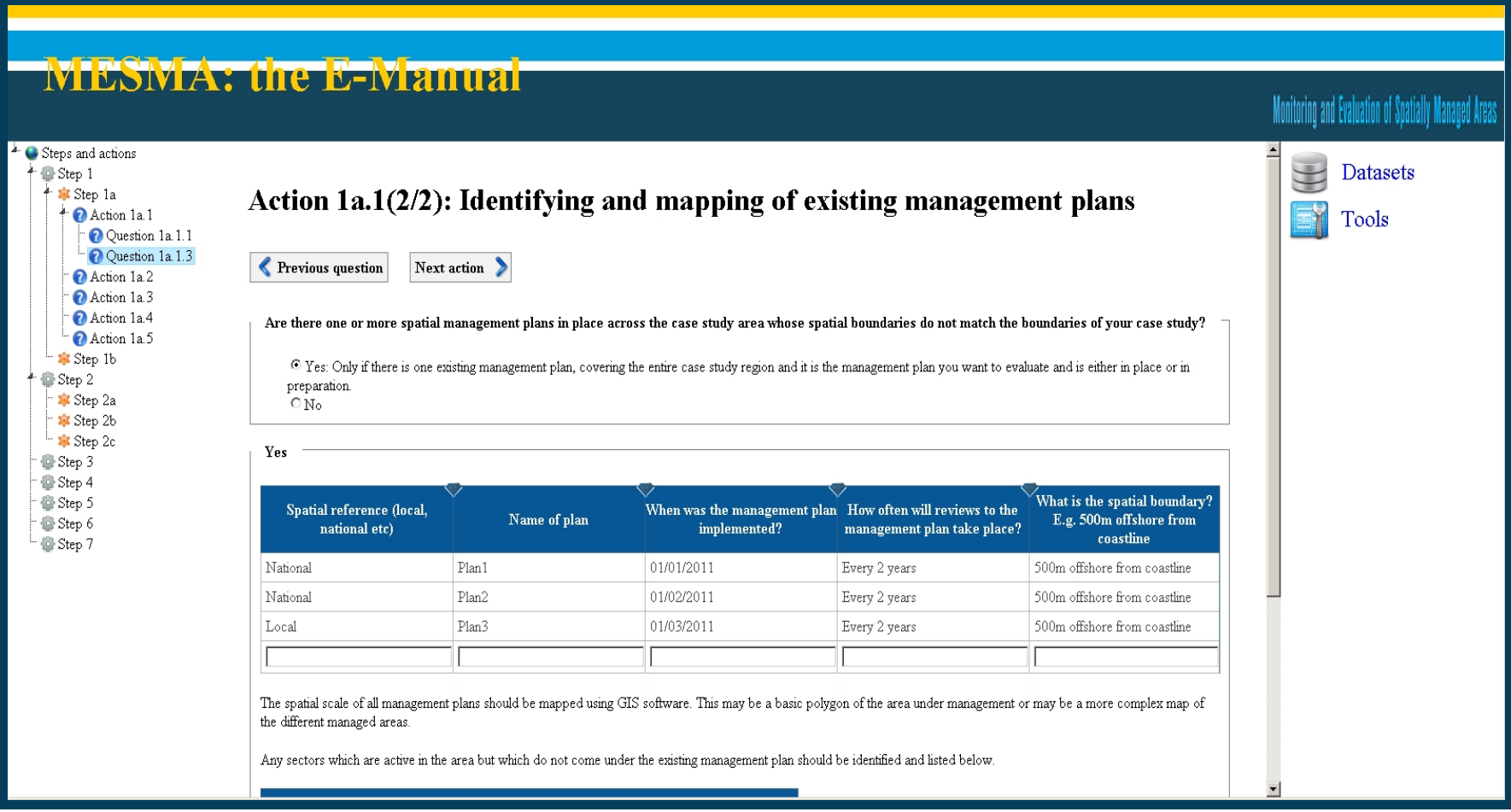
Tools

Added by Katherine Cronin, last edited by Katherine Cronin on 04-07-2011 (view change)

Home | TOOLS | Add a tool | Useful Documents | Useful Data Portals | Tool Ideas from outside EU | About WP4 | WP4 Contacts

Tool Name *	MarineMap
Category *	Decision support:
What step(s) in framework *	4. Risk Analysis and State Assessment 5. Assessment of Findings against Operational Objectives 6. Evaluation of Management Effectiveness
Description *	MarineMap is a web-based decision support tool for open and participatory spatial planning in the marine environment. MarineMap offers a simple, flexible and powerful means of gathering expertise from resource managers, scientists, stakeholders and public in a process of collaborative decision making. It offers users web-based access to all of the data, methods and analyses that scientists use to evaluate Marine Protected Areas (MPAs). Without special training or assistance, working in a group setting or at home, MarineMap users can draw, evaluate and discuss prospective MPAs.
Inputs	
Data Quality Required	
Modification Required	The MarineMap code is open source and adaptable to situations and environments around the world.
Expertise Required	With MarineMap, users need no Geographic Information Systems (GIS) training to be able to participate in sophisticated marine planning.
Outputs	Visualize social and ecological attributes of coastal areas Draw and assemble networks of prospective MPAs Specify types of regulations to be applied to each MPA, as well as goals and objectives fulfilled Generate reports that assess MPAs according to scientific guidelines as well as social and economic impacts Share MPA boundaries and networks with other users Discuss results with others in online forum Quickly and easily modify existing MPA concepts as the process evolves
Spatial and Temporal Scales	
Licence Cost Issues	No:
Download	The MarineMap source code is issued under the the BSD license and available for download from Google Code. http://code.google.com/p/marinemap

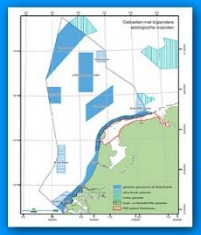
- *e*-manual for framework under development



Geoportal

- to store, discover, and visualise data and metadata to support the monitoring and evaluation of SMA's
- ISO and Inspire standard compliant metadata profile has been designed and implemented on GeoNetwork
- 130 records for the 9 case studies (http://mesma.ucc.ie/)

MESMA website



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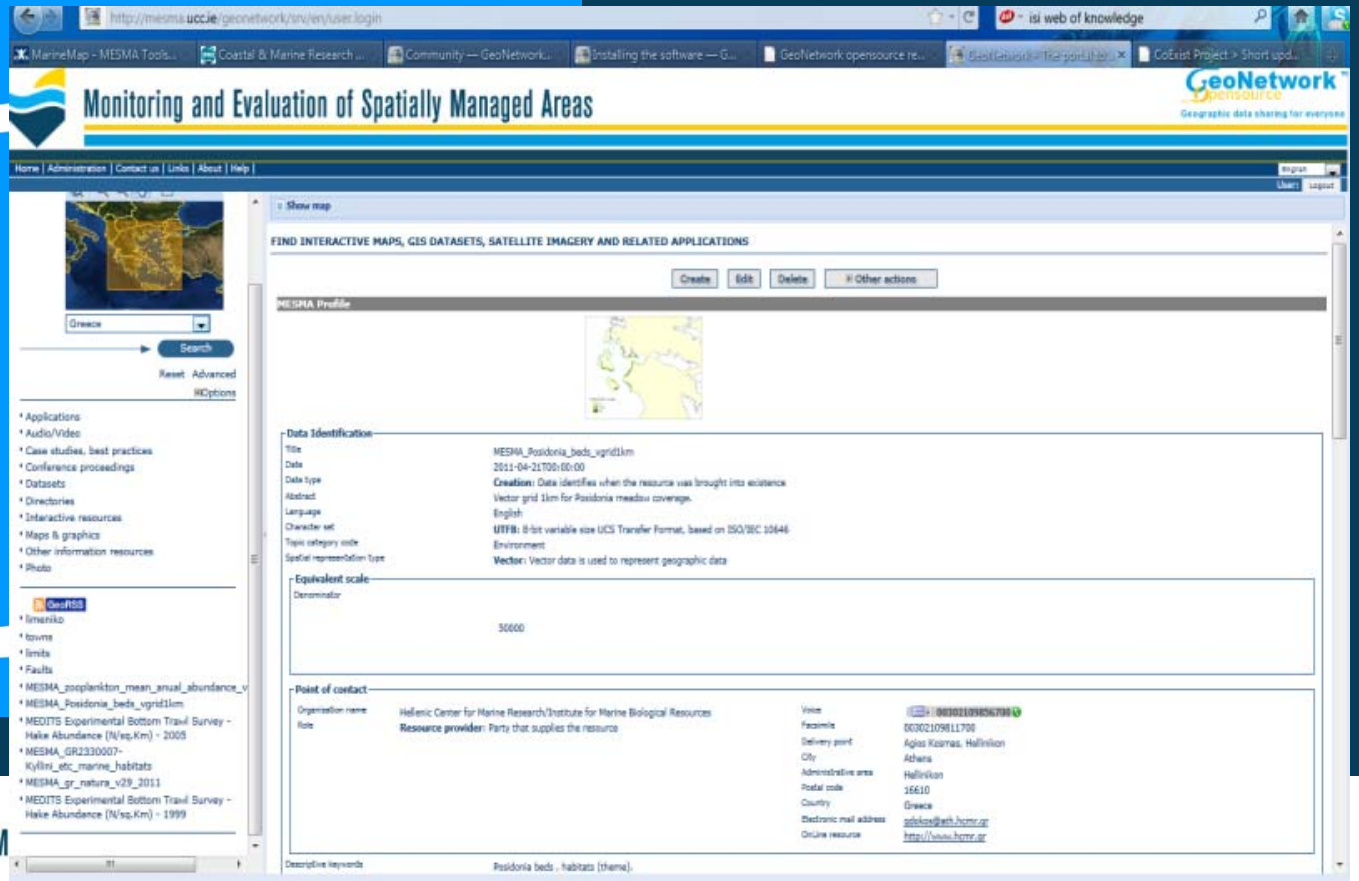

MSFD vs. MESMA assessment approach

- Integrated ecosystem assessment (IEA) framework guides the analysis of scientific information in relation to management objectives

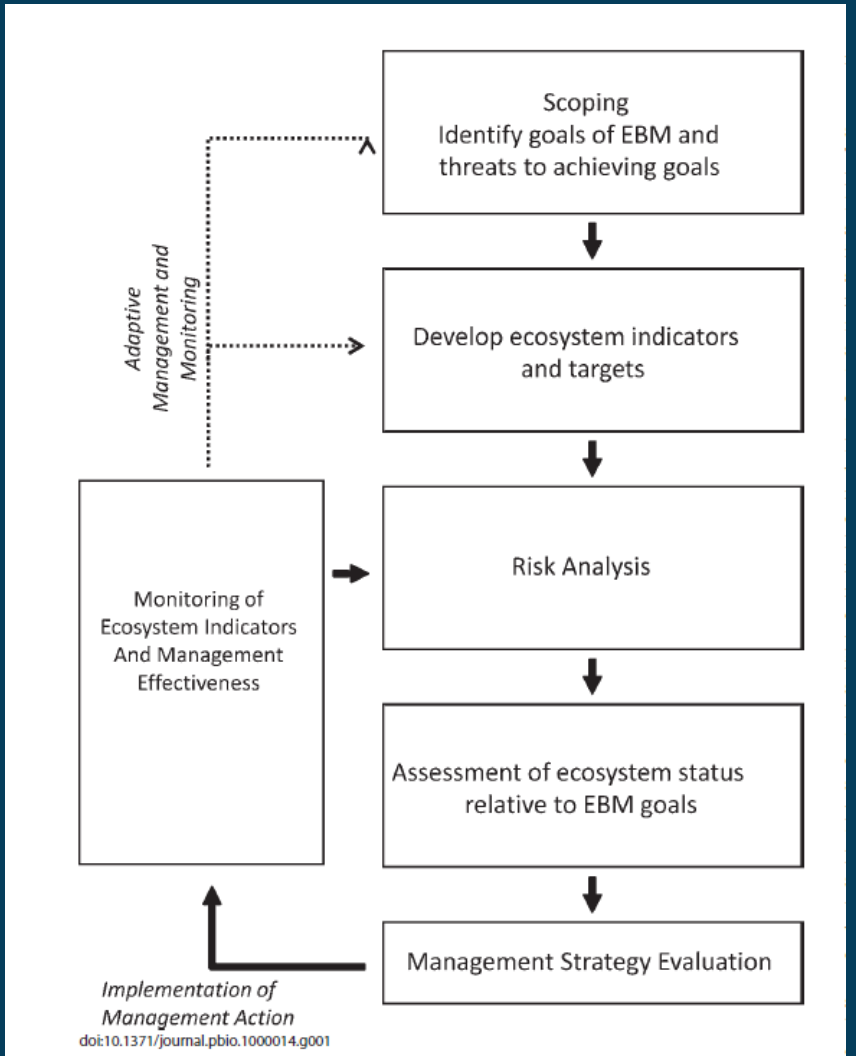

Figure 1. The Five-Step Process of Integrated Ecosystem Assessment
An IEA begins with a scoping process to identify key management objectives and constraints, identifies appropriate indicators and management thresholds, determines the risk that indicators will fall below management targets, and combines risk assessments of individual indicators into a determination of overall ecosystem status. The potential of different management strategies to alter ecosystem status is evaluated, and then management actions are implemented and their effectiveness monitored. The cycle is repeated in an adaptive manner.

Taken from Levin et al (2009)

MSFD vs. MESMA assessment approach

MSFD		MESMA
Regional seas	⟷	Spatially managed area
GES as overarching goal	⟷	Vision/goal for SMA
11 descriptors	⟷	Multiple operational objectives
Set of indicators per descriptor	⟷	Set of indicators per objective
Integration of assessment	⟷	Integration of assessment

Commonalities:

→ Allow for the monitoring and evaluation of distinct sea areas
→ Concept of activities –pressure- impact
→ Indicator based assessment

Use of MESMA tool box for MSFD related assessments?

MESMA tools such as…..

……the **framework manual** provides practical guidance on the analysis of (spatially explicit) scientific information

……the **governance analytical structure** provides a systematic approach for analyzing conflicts and the incentives that are employed to address them, while addressing the wider social, political and institutional context in a particular case study

……the **Geoportal** reflects a model for the standardized warehousing of metadata and geodata

……the **tools wiki** is a useful resource for practical guidance and relevant dataportals

MESMA tool box contains practical and integrated elements !

MESMA

Monitoring and Evaluation of Spatially Managed Areas

SEVENTH FRAMEWORK PROGRAMME

www.mesma.org

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