Monitoring and Evaluation of Spatially Managed Areas

Application of the MESMA Framework.
Case Study:
Skagerrak sub-area

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Action 2c.1 Using data collected in step 1b list the existing management measures relevant to the spatial and temporal scale of the SMA and the operational objectives

Generally, management measures can be grouped according to:

- Economic measures
- Interpretative measures
- Knowledge measures
- Legal measures
- Participative measures

Management measures are discussed in the governance analysis undertaken by WP6 – it will be helpful to refer to section 5 of the Governance Analytical Structure to complete this action. Please note that the WP6 analysis focuses only on one priority objective and so additional information may need to be gathered under this action to provide a comprehensive list.

In this assessment we focus only on the interactions between gillnet fishing activities and harbour porpoise conservation features (according to the EU Habitat Directive) in the area. As work relating to corresponding incentives within WP6 is not yet complete, this section cannot be dealt with now. Please see Skagerrak governance report for future reference.

Step 3 Selecting indicators and thresholds

The previous steps produced the spatial boundaries (step 1a) for the assessment and defined a suite of ecological and socio-economic operational objectives (step 1b). The selected objectives have been related to the relevant ecosystem components (step 2a), with an examination of the spatial overlap between those components. The spatio-temporal distribution pattern of human pressures has also been assessed (step 2b).

The aim of this step is to guide the assessor through a standardised process of how to select indicators and respective thresholds in relation to the operational objectives specified in step 1b and the relevant ecosystem components identified in step 2b. The guidance consists of how to assess the appropriateness of the indicators (viability analysis) and how to report on both the rationale for selecting thresholds or using trends and gaps in data availability. The output of this step is a list of indicators suitable for assessing an existing marine spatial management plan or an envisioned spatial management scenario. The actual assessment of the state of the indicators or the potential risks in relation to a suggested management scenario in relation to human pressures will be conducted in step 4 (Figure 3.1).

Step 2
Data collection
and mapping

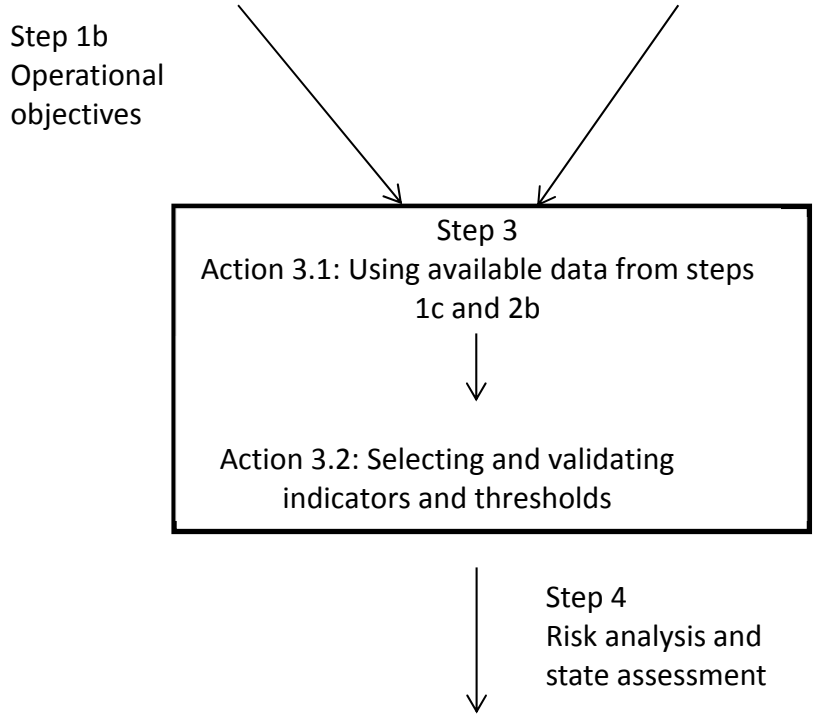

Figure 3.1. Work flow for step 3.

Action 3.1 Using available data from steps 1b and 2b

For each operational objective defined in step 1b, identify the relevant ecological, socio-economic and other components (step 2a) and compile information on the availability of relevant data. Using this information fill out table 3.1 for each operational objective.

Table 3.1

Operational objective	Environmental , socio-economic, other component	Quality of available data (GIS based/Expert knowledge/Qualitative information)	Description /Source /Accessibility	Potential conflicts
Favourable conservation status	Environmental: Porpoise population	Data on the porpoise population is very limited and dispersed since the data has been collected from 1997 -2012.	The data belongs to Århus University. Special permit is needed to access the data.	

Action 3.2 Selecting and validating indicators

The indicators will be chosen to enable tracking of the operational objectives set for the specific SMA, to see if they are met.

An extensive knowledgebase on indicators exists already and has been partly collated within WP1 of MESMA. Examples of indicators can be taken from a number of sources. In the European Seas a global objective is Good Environmental Status (GES), as described in the Marine Strategy Framework Directive (2008/56/EC) and the Commission Decision 2010/477/EU. The MSFD (Annex I) proposes 11 descriptors of the GES (i.e. Biological diversity, Alien species, Commercial Fish, Food webs, Eutrophication, Sea floor integrity, Hydrography,

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Contaminants, Contaminants in food, Marine litter and Energy, including noise) that cover the most common components relevant for many of the different operational objectives. Several task groups developed a suit of 83 indicators (see D2.1) for those descriptors (2010/477/EU). Some of those indicators are already elaborated for the needs of the WFD (2000/60/EC) and were published and tested in the inter-calibration process. Others are in preparation and the complete set of indicators for the 11 descriptors will be ready by 2015.

Another source of indicators is the 'Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management' (2006, UNESCO). Practical experience from the implementation of integrated coastal zone management (ICZM) produced an array of literature on relevant indicator selection (see e.g. Diedrich et al. 2010 and references therein). Like the implementations of ICZM, there are a number of studies that aim to evaluate the effectiveness of marine protected areas (MPAs) using indicators. For further details on these and for the references used in this section please consult D2.1.

Indicators (state and pressure indicators) should be viable from both a scientific and a management perspective. For each of the selected candidate indicators, conduct a viability analysis by scoring the indicators as very good (5); good (4); intermediate (3); poor (2); very poor (1) or unsuitable (0), using the set of criteria listed in table 3.2.1 (modified after ICES criteria for good indicators). The table summarises the scoring results for all candidate indicators and indicates if the respective indicator has been selected for subsequent analysis. From the final set of indicators, identify which are most important for evaluation of ecological status, pressures, impacts, and management measures in the SMA; this enables prioritisation if resources are limited.

Table 3.2.1

Operational objective	Indicator	Criteria for viability analyses*											Total score	Selected (Y/N)
		Relatively easy to understand by non-scientists and those who will decide on their use	Sensitive to manageable human activity	Sensitivity to change (change over time)	Relatively tightly linked in time to that activity	Easily and accurately measured with a low error rate	Responsive primarily to a human activity, with low responsiveness to other causes of change	Measurable over a large proportion of the area to which the indicator metric is to apply	Based on an existing body of time-series of data to allow a realistic setting of objectives	State of the development of the methodology to calculate the indicator (all formulas and measurements defined (3); more work needed (2); none (1))	Complexity of managing the indicator (high level of coordination or expensive technological requirements)	Remarks /Uncertainty assessment		
Favourable conservation status	*Bycatch incidents*	*0*	*5*	*3*	*4*	*1*	*4*	*2*	*4?*	*1*	*3*		*27*	*Y*
Favourable conservation status	*Porpoise population*	*0*	*3*	*3*	*2*	*1*	*2*	*2*	*4?*	*1*	*5*		*23*	*N*
Favourable conservation status	*Porpoise distribution*	*2*	*3*	*3*	*2*	*1*	*2*	*2*	*4?*	*1*	*5*		*25*	*Y*
		**Scores for viability analyses: very good= 5; good = 4; intermediate= 3; poor=2; very poor=1; unsuitable = 0*												

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After selecting the most appropriate indicators for each goal/operational objective, fill in the following table 3.2.2 to identify gaps in the available data.

In table 3.2.2, availability means true access to the required data (restrictions in data sharing may obstruct access to existing data; such data should be indicated as unavailable and a comment should be provided in the 'Remarks' column explaining the reasons for non-accessibility).

Table 3.2.2

Goal/Operational Objective	Indicator	Needed data	Availability (YES/NO)	Remarks
Favourable conservation status	*Bycatch*	*Data on position of incidental bycatch of porpoises*	*To some degree*	*Data is only from 4 CCTV vessels and is therefore not representative for the whole fleet.*
Favourable conservation status	*Porpoise distribution*	*Data on porpoise distribution*	*To some degree*	*Data is dispersed over a long time period 1997-2012*

Another important step is the definition of thresholds against which the status of the indicators can be assessed. Any thresholds or reference points should ideally reflect high level goals. Thus a respective reference point indicates a level of sustainable use or development. Whilst for some established indicators, respective thresholds may be defined, for others, thresholds have yet to be defined. List the indicators and the availability of thresholds in table 3.2.3.

Table 3.2.3

Indicator	Threshold already established (YES/NO)	If YES, explain how the threshold was derived (e.g. using the sustainability or precautionary principle)	Trend (e.g. rate, direction or sign of change)	If a trend is used instead, elaborate on a good and bad trend
Bycatch	*Yes*	*To keep the population on a sustainable level*	*a bycatch rate on 1.7% is generally accepted*	

The 1.7% is not legally binding in EU waters but is simply a rate that has been proposed by ASCOBANS. The 1.7% threshold is very difficult to evaluate since the population within the study area uses not only these sites but belongs to the whole North Sea population.

For the indicators listed in table 3.2.3 where no threshold is established and no trend will be used, describe how the threshold will be derived to conduct step 4, using either: 1) historical data, 2) model estimates, 3) reference areas (high pressure vs. low pressure) or 4) expert knowledge. Subsequently, the rational and derived thresholds should be outlined.

Using the above tables, identify where there are gaps in the data and produce a (textual or tabular) summary of any gaps that are preventing estimation of the selected indicators. Suggest how it might be

possible to solve this problem by obtaining access to unavailable data, for example through monitoring programs to collect additional data.

As mentioned the data set on both bycatch and fishing areas for vessels >12m is limited to only cover 4 vessels, which are equipped with Closed Circuit TV cameras. These four vessels are not representative for the whole fleet, and therefore the bycatch data only gives indications on where bycatch possibly can occur. It is therefore possible that bycatches will occur in other unknown places.

According to porpoise distribution data, the dataset is collected over a long time period 1997-2012. Very few animals have therefore been tagged every year making it impossible to analyse for possible changes in distribution between years. If the data set is to be used, data from all years needs to be extracted and it must be assumed that porpoises have not changed their overall distribution since 1997.

Step 4 Risk analysis and state assessment

After the performance indicators have been selected and their thresholds (or trends) determined (step 3), step 4 now looks into the technical characterisation of risk (step 4a) and/or state (step 4b). It is important to differentiate between the two (risk and state); both depend on the level of development of the spatial management plan. If a spatial management plan is not in place, step 4 should calculate the likelihood of meeting the operational objectives, as summarized by the indicators and their targeted thresholds or trends (i.e. risk analysis, step 4a). If a spatial management plan is in place, step 4 should (also) calculate whether or not the operational objectives were met, relative to the indicators and their targeted thresholds or trends (i.e. state assessment, step 4b). The output of step 4, the characterization of the risk or the actual state, will feed into the evaluation of meeting the operational objectives (step 5), where the interpretation of the risk analysis and or state assessment will be carried out.

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