Methodology for cost and benefit assessment for coordinated measures

***For the joint implementation of the Marine Strategy Framework Directive (MSFD) in Bulgaria and Romania – Phase 2***

Version 02/12/2015

# Introduction

The main question to be answered in costing of potential Black Sea measures - as input for the Cost-Effectiveness (CEA) and Cost-Benefit Assessment (CBA) - is how much the implementation of the given measure costs the society (in terms of public and private costs).

In order to get insight in the different costs of measures and to assign values to it, a **stepwise approach** has been proposed:

1. Defining operational actions for the measures

2. Assigning cost components to measures

3. First rough assessment

4. Detailed assessment

The breakdown of the measure into operational actions (step 1) facilitates the identification of the cost components (step 2). Especially step 4, the detailed cost assessment, requires that both step 1 and 2 have been carried out to a certain level of detail, to allow this more detailed approach.

Due to a general lack of data, a full cost and benefit analysis (detailed assessment) of each individual measure will often not be feasible. Also the proposed measures under this support contract need further consideration at national and regional level (e.g. further specifications, answers to assumptions made, etc.) to be able to undertake a detailed cost-benefit assessment. The assessment presented should therefore be seen as an illustration of the CEA/CBA methodological approach, as a starting tool to be used by Bulgaria and Romania in the development of their PoM.

# Stepwise approach

## Defining operational actions for the measures (step 1)

Within the assessment for coordinated measures for the joint implementation of the MSFD, the following broad categories of measures/operational actions will be applied:

* Legal (for regulator and regulated)
* Institutional
* Policy instruments (including fiscal & economic instruments)
* Technical
* Capacity building and awareness raising: communication, training, etc.

Different types of measures and operational actions require different types of cost input to be implemented. As an example, for legal measures the main cost element consist of the time needed to draft the laws and administer them. Costs will be dedicated for research, stakeholder consultations, preparative meetings and legal enactment. Once the measure is implemented other types of costs need to be taken into account, such as administration, monitoring and prosecution costs. Also the value lost to society of any goods and services that will not be produced and consumed as a result of a regulation/implementation of a measure, is worth considering. In case of technical measures, additional costs of introducing new measures mainly consist of investment costs, operational & maintenance costs.

## Assigning cost components to measures (step 2)

The breakdown of the measure into operational actions (step 1) facilitates the identification of the cost components. For each measure/operational action the basic cost components and their temporal scale (one off; yearly costs, time period) need to be determined. These cost components are further determined by their specific cost indicators, as shown in Table 2.

Per measure cost templates will be filled summarizing the information on the related cost components identified for the different operational actions of the measure (see template in annex).

Table 1 : Cost components per type of measure

|  |  |
| --- | --- |
| Type of measure/operational action | Cost component |
| Legal | * Research costs * Negotiation costs * Implementation cost for a law, regulation, etc. * Sectoral costs |
| Institutional | * Management costs * Engagement costs |
| Policy instruments (incl. economic) | * Research costs * Negotiation costs * Costs for assistance with voluntary agreements * Sectoral costs |
| Technical | * Technical implementation costs (O&M) * Sectoral costs |
| Capacity building and awareness raising | * Cost of stakeholder consultation * Communication costs * Training costs * Costs for awareness raising |

Table 2 : Cost components and their related cost indicators

|  |  |
| --- | --- |
| Cost component | Cost indicators |
| Cost of stakeholder consultations | * Staff time (preparation, follow up) * Meetings with stakeholders |
| Implementation costs for a law, regulation | * Preparation (Planning, writing) * Consultation, dealing with objections, etc. * Finalisation (Approval and sign-off, advertising |
| Costs for assistance with voluntary agreements | * Staff time (preparation, follow up) * Meetings with neighbouring MS * Travel & other costs |
| Negotiation costs | * Planning & preparation * Drafting agreement & Ratification * Meetings with neighbouring MS * Travel & other costs |
| Management costs | * Staff time (preparation, follow up) * Meetings with neighbouring MS * Travel & other costs |
| Research costs | * Research time * Information and meeting costs * Alternative approach: costs of similar research projects |
| Training costs | * Preparation * Training material (courses) * Giving training |
| Enforcement costs | * Surface surveillance * Joint enforcement patrols with local officer * Aerial surveillance * Investigations/prosecutions |
| Communication costs | * Advertisement * Staff time * Other administration costs |
| Cost for awareness raising | * Staff time (preparation, follow up) * Awareness raising material |
| Technical implementation costs | * Investment costs * Operational costs * Maintenance costs |
| Sectoral costs | * Investment & operational costs * Loss of added value * Loss of employment |

## First rough assessment

Based on the breakdown of measures and their operational actions into cost components, a first rough cost indication should be obtained. Costs will be divided into low, medium, high categories each with a preliminary cost range[[1]](#footnote-1);

* Low: < 50.000 €
* Moderate: 50.000 – 500.000 €
* High: > 500.000 €

This first assessment gives an indication of broad cost ranges and enables to assign the appropriate time/effort of further detailed analysis (see 4). Focus should be placed on high cost measures. Low cost measures may be shifted backward and analysed more approximatively (less worth the effort). Based on the outcomes of the detailed assessment, the 3 cost categories will be further divided into 5 size classes when more accurate estimates have been made (see paragraph 1.1.3.3).

## Detailed assessment

As a final step in the cost assessment, cost data will be assigned to each cost component of the selected measures/operational action. Per category of measures the possible cost components are grouped, each including a table where cost data can be filled in, in a structural way. The costs will be given as one off cost and total annual costs,in case of operational costs, per Member State.

### Cost assumptions & unit cost data

Unit cost data (e.g. rate par day €) will in first instance be obtained from cost assessments done in the Black Sea and in other regional seas (e.g. Reinhard *et al*. (2012), TDA (2008), Halkos (2013)). Cost data have further been fine-tuned during the CBE 3/4/5 meeting (Brussels, May 2015).

Costs for transboundary measures may be assigned to each MSbased on geographical (e.g. coast length) or demographic/economic properties (coastal population, tourists, number of fishery ports, fishermen.

The following unit costs were discussed and agreed during the CBE 3/4/5 with the participating experts from Bulgaria and Romania:

| Unit cost category | Unit cost |
| --- | --- |
| Personnel costs (cost per FTE per manday) | * Policy officer 70 Euro * Researcher 50 Euro * Marine officer 60 Euro * Police officer 60 Euro * External consultant 250 Euro |
| Research costs (cost per year) | * Cost for 1 researcher: 10.000 Euro (50 Euro per manday x 200 mandays per year) * Research team of 5 researchers: 50.000 Euro (10.000 Euro x 5 researchers) |
| Meeting costs per participant (cost per day) | * Venue costs 20 Euro * Hotel & catering 80 Euro * Travel costs per participant (cost per trip BG-RO) : 70 Euro |
| Meetings between MS: unit cost per meeting:  *Meeting costs* | * Staff time: 3 working days (preparation, travel, full day meeting): 200 Euro (3 x 70 Euro, rounded to 200 Euro) * 3 public servants per meeting * Total costs per meeting: 600 Euro (200 Euro x 3) |
| *Staff travel/accommodation* | * Venue: 1 day; hotel & restauration costs: 2 nights: 180 Euro (20 Euro + 2 x 80 Euro) * Travel costs: 70 Euro * 3 public servants per MS per meeting * Total costs per meeting: 750 Euro (250 Euro x 3) |
| Surveillance costs | * Cost per shipping hour (including staff)   + Shallow water: 150 Euro   + Open water: 350 Euro   + Motorboat: 25 Euro * Cost per aerial surveillance hour: 500 Euro * Yearly cost per FTE (police officer): 12.000 Euro (60 Euro per manday x 200 mandays per year) |

### Assigning costs to each cost component of the measure

Legal measures

* Negotiation costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Planning & preparation |  |  |  |
| Drafting agreement & Ratification |  |  |  |
| Meetings with neighbouring MS |  |  |  |
| Travel & other costs |  |  |  |
| **Total implementation cost** |  |  | **€** |

* Research costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Research costs |  |  |  |
| **Total cost** |  |  | **€** |

* Alternative approach: cost of similar research programmes
* Implementation costs for a law, regulation, …

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Preparation (Planning, writing) |  |  |  |
| Consultation, Dealing with objections, |  |  |  |
| Finalisation (Approval and sign-off, advertising) |  |  |  |
| **Total implementation cost** |  |  |  |

* Sectoral costs

|  |  |  |
| --- | --- | --- |
| **Actions required** | **Estimated one-off cost, €** | **Estimated cost per year (€)** |
| Investment costs |  |  |
| Operational costs |  |  |
| Loss of added value |  |  |
| Loss of employment |  |  |
| **Total cost** | **€ -** | **€ -** |

Institutional measures

* Management costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days/yr** | **Estimated rate per day (€)** | **Estimated cost per year €** |
| Staff time (preparation, follow up) |  |  |  |
| Meetings with neighbouring MS |  |  |  |
| Travel & other costs |  |  |  |
| **Total estimate:** |  |  | **€ -** |

* Enforcement costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of controls/yr** | **Estimated cost per control (€)** | **Estimated cost per year (€)** |
| Surface surveillance |  |  |  |
| Joint enforcement patrols with local officer |  |  |  |
| Aerial surveillance |  |  |  |
| Investigations/prosecutions |  |  |  |
| **Total surveillance cost** |  |  |  |

Policy instruments

* Negotiation costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Planning & preparation |  |  |  |
| Drafting agreement & Ratification |  |  |  |
| Meetings with neighbouring MS |  |  |  |
| Travel & other costs |  |  |  |
| **Total implementation cost** |  |  | **€** |

* Research costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Research time |  |  |  |
| **Total cost** |  |  | **€** |

* Alternative approach: cost of similar research projects
* Costs for assistance with voluntary agreements

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Staff time (preparation, follow up) |  |  |  |
| Meetings with neighbouring MS |  |  |  |
| Travel & other costs |  |  |  |
| **Total estimate:** |  |  | **€ -** |

* Sectoral costs

|  |  |  |
| --- | --- | --- |
| **Actions required** | **Estimated one-off cost, €** | **Estimated cost per year (€)** |
| Investment costs |  |  |
| Operational costs |  |  |
| Loss of added value |  |  |
| Loss of employment |  |  |
| **Total cost** | **€ -** | **€ -** |

Technical measures:

* Technical implementation costs

|  |  |  |
| --- | --- | --- |
| **Actions required** | **Estimated one-off cost, €** | **Estimated cost per year (€)** |
| Investment costs |  |  |
| Operational costs |  |  |
| Maintenance costs |  |  |
| **Total cost** | **€ -** | **€ -** |

* Sectoral costs

|  |  |  |
| --- | --- | --- |
| **Actions required** | **Estimated one-off cost, €** | **Estimated cost per year (€)** |
| Investment costs |  |  |
| Operational costs |  |  |
| Loss of added value |  |  |
| Loss of employment |  |  |
| **Total cost** | **€ -** | **€ -** |

Capacity building and awareness raising measures

* Costs of stakeholder consultations

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Staff time (preparation, follow up) |  |  |  |
| Staff travel/accommodation |  |  |  |
| Meeting costs |  |  |  |
| **Total estimate:** |  |  | **€** |

* Communication costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Advertisement |  |  |  |
| Staff time |  |  |  |
| Other administration costs |  |  |  |
| **Total estimate:** |  |  | **€ -** |

* Training costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Preparation |  |  |  |
| Training material (courses) |  |  |  |
| Giving training |  |  |  |
| **Total estimate:** |  |  | **€ -** |

* Cost for awareness raising

|  |  |  |  |
| --- | --- | --- | --- |
| **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** |
| Staff time (preparation, follow up) |  |  |  |
| Awareness raising material |  |  |  |
| **Total estimate:** |  |  | **€ -** |

### Interpretation of the results

**Time period in the frame of Cost effectiveness analysis**

Costs will be assessed over a timescale of 6 years, correspondingly to the MSFD planning cycle. The decision to use this timeframe was based on various factors:

* time period in line with the policy cycle and its time horizon for budgeting;
* increased acceptance by stakeholders (e.g. businesses adjust their activities rather in the medium than in the long term, based on e.g. 5 years budgets);
* room for evaluation and adjustment of measures;
* a time frame that can be reflected in the state budget.

**Discount rate**

Costs and benefits are calculated over the period using a discount rate of 4%, conform the EC Impact Assessment Guidelines (2009)[[2]](#footnote-2). The NPV that can be calculated based on the discounted rate allows decision makers to get insight in the total costs over the analysed time period.

**Approach to assign certainty**

The certainty of attributing costs to the different cost components at this stage of the Programme of Measures is varying. Some components, such as sectoral cost to fisheries are not yet possible to estimate where others, such as awareness raising measures, can rely on known budgets for similar projects from the past. In order to include uncertainty in the cost estimation, the following 3 scale of likelihood will be included previous to the scoring[[3]](#footnote-3).

* Green: Certain (>66% probability)
* Yellow: Medium uncertainty (>33–66% probability)
* Red: Uncertain (<33% probability)

Estimates of certainty are derived from expert judgment and existing literature examined for this assessment. They give an indication on certainty and do not influence the calculated total discounted costs.

**Scoring of the costs**

The **evaluation of costs**, in the frame of cost effectiveness analysis, will be done in a semi-quantitative manner using size classes, which are converted into scores of 1 to 5[[4]](#footnote-4), as shown in the table below (illustrative example).

Table 3 : Proposed size classes for cost assessment of potentially coordinated measures in the Black Sea Region

|  |  |  |
| --- | --- | --- |
| **Score** | **Cost categorie** | **Total costs** |
| 1 | High | > € 1 million |
| 2 | High | € 500.000 - 1 million |
| 3 | Moderate | € 200.000 - 500.000 |
| 4 | Moderate | € 50.000 - 200.000 |
| 5 | Low | < € 50.000 |

# Benefit assessment

## Proposed approach

To be able to carry out a CBA (cost benefit analysis) there is a need to assess the benefits. For each measure information is needed on:

* The challenge (the gap between the status and the GES) that the measure is target at – is it small, medium, large? As the measures will cause a marginal change to the status, knowledge on the gap is needed to assess the potential benefits of the specific measure (with belonging actions).
* The impact of the measure towards the environment and the society. What are the impacts caused by the implementation of the measure in the short and long run?
* The importance of the measure (towards environmental/society). Does it represent a high value? Either for use / non-use, a specific sector, prioritized policy? Which co benefits can be identified related to the specific measures? Are there positive or negative spill over due to the implementation of the measure?

Monetary valuation estimates will allow to translate the physical impacts into monetary terms (if enough data is available for a monetary CBA)

* Stakeholder acceptance (potential for realizing the full benefit of the measure). This information is also relevant to assess the effectiveness of the measure and informs the discussion of the probability that the measure will be effectively implemented and, consequently, the full benefits included. E.g. if measures are assessed ex ante, the potential benefits are likely to be higher than the benefits monitored later.

The benefits are to be described in qualitative terms and they will be assessed by scoring the time scale and the benefits over the analysed time period.

* The time scale is scored as:
  + 1 long
  + 3 intermediate
  + 5 short

If a measure is estimated to have a quick positive impact on the marine environment, it gets a high score and when it takes a long time, the score is low.

* The scoring of the benefits is categorized as follows:
  + 1 low
  + 3 medium
  + 5 high

This general scoring is based on the qualitative description of the measure and the type of actions taken to implement the measures.

Based on the two scores, a weighted average is calculated and used as a total benefit score, to be used in the C/B ratio calculation.

## Interpretation of the results

**Time period in the frame of Cost Benefit analysis**

The costs and benefits of the options for GES targets are compared to the baseline scenario. Costs and benefits are recommended to be assessed over a timescale of 20 or 30 years. It provides a sufficiently long period over which environmental benefits may arise and the MSFD measures may be implemented. Assessment of the impacts beyond this recommended time period becomes more uncertain. However, the analysis assumes that all the environmental benefits accrue within this time period. In reality benefits are likely to be realised over a longer time horizon.

**Discount rate**

Costs and benefits are calculated over the period using a discount rate of 4%, conform the EC Impact Assessment Guidelines (2009).

**Approach to assign certainty**

In order to include uncertainty, it is recommended to assess benefits within a wide range (minimum and maximum values) due to scientific uncertainty and to work with both a pessimistic and optimistic scenario. Also, the sources of uncertainty within the analysis should be identified, and the analysis should test the assumptions used in order to reflect some of this uncertainty.

# Relevant literature

Arcadis, Bath University, EUCC (2012a). Economic assessment of policy measures for the implementation of the MSFD. Final report of a study for the EC DG ENV (Project No 11601).

DEFRA.(2011). Impact Assessment of MSFD – targets and indicators for Good Environmental Status. Department for Environment, Food and Rural Affairs. London

DHV (2011). Measures for the Marine Strategy Framework Directive. First overview of potential measures, related costs and effects of implementing the Marine strategy

European Commission. (2009). Impact assessment guidelines. Available online: <http://ec.europa.eu/smart-regulation/impact/commission_guidelines/docs/iag_2009_en.pdf>.

Finding Sanctuary, Irish Seas Conservation Zones, Net Gain and Balanced Seas. 2012. Impact Assessment materials in support of the Regional Marine Conservation Zone Projects' Recommendations.

Halkos, George (2013): Cost-effectiveness analysis in reducing nutrient loading in Baltic and Black Seas: A review. http://mpra.ub.uni-muenchen.de/52296/

Mangos A., Claudot M.-A. (2013). Economic study of the impacts of marine and coastal protected areas in the Black. Plan Bleu, Valbonne

MRAG Ltd., IDDRA and LAMANS Management Services S.A. (2013). Costs and benefits arising from the establishment of maritime zones in the Black Sea

Reinhard, S., A. de Blaeij, M.-J. Bogaardt, A. Gaaff, M. Leopold, M. Scholl, D. Slijkerman, W.-J. Strietman and P. van der Wielen (2012). Cost-effectiveness and cost-benefit analysis for the MSFD – Framework for the Netherlands. Lei report.

UNEP/MAP (2013). Background Document on Marine Litter Regional Plan Measures and Indicative Cost Estimation of Measures Implementation

UNEP MAP. (2014). Guidelines for updating National Action Plans for the implementation of the LBS Protocol and its Regional Plans in the framework of SAP MED to achieve Good Environmental Status for pollution related ECAP ecological objectives UNEP(DEPI)/MED WG.404/7 Annex IV (with Appendices)

Annex: CEA/CBA Template for (coordinated) measures

| MEASURE | *(Measure title)* | *Code:*  *MSFD reporting code* |
| --- | --- | --- |
|  | *Management area:*  *Any other codes:* | *N° of measure:*  *MSFD measure list* |
| **PART I** | **Detailed cost assessment** |  |
| **Operational action 1** | *Short, precise description of the operational actions* | |
| **Assumptions** | *Summarize the assumptions related to operational action*   * XXX * XXX | |
| **Cost components** | * Implementation costs for a law, regulation, …  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** | **Geogr. Cost level** | | Preparation (Planning, writing) |  |  |  |  | | Consultation, Dealing with objections, |  |  |  |  | | Finalisation (Approval and sign-off, advertising) |  |  |  |  | | **Total estimate:** |  |  |  |  | | |
|  | * Management costs  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Actions required** | **Estimated nr of days/yr** | **Estimated rate per day (€)** | **Estimated cost per year €** | **Geogr. cost level** | | Staff time (preparation, follow up) |  |  |  |  | | Staff travel/accommodation |  |  |  |  | | Meeting costs |  |  |  |  | | **Total estimate:** |  |  | € - |  | | |
|  | * *Other cost components* * *(relevant table to be included)* | |
| **Operational action 2** | *Short, precise description of the operational actions* | |
| **Assumptions** | *Summarize the assumptions related to operational action*   * XXX * XXX | |
| **Cost components** | * Implementation costs for a law, regulation, …  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Actions required** | **Estimated nr of days** | **Estimated rate per day (€)** | **Estimated one-off cost per action, €** | **Geogr. cost level** | | Preparation (Planning, writing) |  |  |  |  | | Consultation, Dealing with objections, |  |  |  |  | | Finalisation (Approval and sign-off, advertising) |  |  |  |  | | **Total estimate:** |  |  |  |  | | |
|  | * Management costs  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Actions required** | **Estimated nr of days/yr** | **Estimated rate per day (€)** | **Estimated cost per year €** | **Geogr. cost level** | | Staff time (preparation, follow up) |  |  |  |  | | Staff travel/accommodation |  |  |  |  | | Meeting costs |  |  |  |  | | **Total estimate:** |  |  | € - |  | | |
|  | * *Other cost components* * *(relevant table to be included)* | |
| **Operational action 3** | *(To be worked out in a similar way as defined above)* | |
|  |  | |
| **Total cost of measure (6 years)** | *Total One-off cost within MSFD cycle (6years) per MS:* | |
|  | *Overall uncertainty:* | |
|  | *Scoring (size class):* | |

| PART II | *Benefit assessment* |
| --- | --- |
| **Scoring** | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Identify range of benefits** | **Consider time scale (immediate to long term benefits) (long 1, intermediate 3, short 5)** | **Benefits over the analysed period (monetary if possible) (1 low 3 medium 5 high)** | **Qualitative description of benefits (if valuation is not possible)** | **Benefit estimate (weighted[[5]](#footnote-5) AVG of time scale score and benefit score)** | |  |  |  |  |  | |
| **Other** | * *Other remarks* |

1. These costs should be interpreted as one off costs per Member State, with yearly costs being discounted for. [↑](#footnote-ref-1)
2. Although Member States are free to diverge from this discount rate. E.g. the UNEP/Guidance doc (Annex G) suggests a discount rate of 3% for a time horizon of 10 years. It is nonetheless important to use the same discount rate and time period through the total for all selected measures to be assessed. [↑](#footnote-ref-2)
3. This method is inspired by the ‘Approach Used to Assign Certainty Terms’ of The UK National Ecosystem Assessment (UNEP-WCMC, Cambridge. University; 2011). [↑](#footnote-ref-3)
4. These scores are related to the first rough assessment as follows: low 🡪 score 4,5; medium 🡪 score 2,3; high 🡪 score 1. [↑](#footnote-ref-4)
5. (time + 2\*benefit )/ 3 [↑](#footnote-ref-5)