

Multi-criteria analysis

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Selection of adaptation options

- Among adaptation options, select the most suitable ones
- Rank and select preferred options: multi-criteria analysis
- Include effectiveness and efficiency in assessing



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Use of multi-criteria analysis

‘Multi-criteria analysis or multi-objective decision making is a type of decision analysis tool that is particularly applicable to cases where a single-criterion approach (such as cost-benefit analysis) falls short, especially where significant environmental and social impacts cannot be assigned monetary values. MCA allows decision makers to include a full range of social, environmental, technical, economic, and financial criteria’ (UNFCCC)



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Use of multi-criteria analysis

- MCA is all about multiple conflicting objectives
- Important to identify a single high level objective with sub-objectives
- Key output: A single most preferred option, ranked options, short list of options for further appraisal, or characterization of acceptable or unacceptable possibilities
- Ease of use: Depends on the particular MCA tool employed



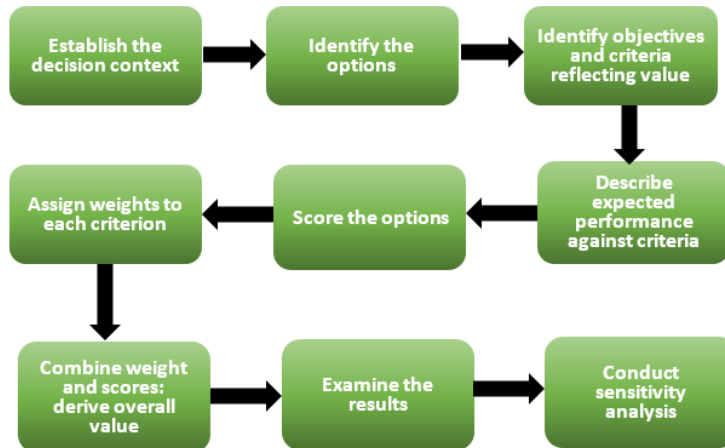
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Multi-criteria analysis - steps

Steps in a multi-criteria analysis



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Establishing decision context

- Central are: decision making body, administrative and historical context, the set of people that may be affected by the decision, and identification of those responsible for the decision
- Important to clearly understand to what overall ambition the decision is seeking to contribute



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Identify options (1)

- Identification of options relies on the exercise of some expert judgment
- Involving affected stakeholders for discussing and deciding on criteria and their weightings for the prioritisation and selection of adaptation options can be useful to identify an appropriate set of options with a high level of acceptance
- Due to the broad range of potential future climate change impacts and their implicit uncertainties, multiple-benefits, no-regret and low-regret adaptation options should be favoured



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Identify options (2)

Effective options

reduce a particular vulnerability or number of vulnerabilities to a desired level

Efficient options

are those whose benefits exceed costs and are more cost-effective than the alternatives. Benefits can be technical, economic, social, financial or environmental



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Identify options (3)

- List the set of options to be considered
- Options identification can hardly be done without (some) intuition
- Early informal sifting may be done against legal and similar restrictions
- Don't define options before being explicit about the objectives! Options are only important for the value they create by achieving objectives!



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Criteria (1)

- Criteria are the measures of performance by which the options will be judged
- Strong criteria are of key importance for the value added through MCA
- Important: Is it possible in practice to measure or judge how well an option performs on the criterion?
- Excessive numbers of criteria can complicate the MCA process and the communication of the MCA results
- It should be possible to judge each option against each criterion
- Judgement should be objective, but may alternatively be judgemental (subjective assessment of an expert)
- Leave out criteria that are unnecessary



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Criteria (2)

AST: the analysis should include criteria, such as....

- urgency with respect to already existing threats
- early preparatory action (to avoid future damage costs)
- range of effect (options covering multiple risks might be favoured)
- cost-benefit ratio
- time-effectiveness
- robustness under a broad range of likely future impacts
- flexibility for adjustments or reversibility in case of diverging developments
- political and cultural acceptability
- enhancement of learning and autonomous adaptive capacity
- and others



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Scoring

- Ensure that the sense of direction for scores is the same in all cases
- Standard approach is to allot scores between 0 and 100 to each criterion
- Assess the expected performance of each option against the criteria
- Score the options on the criteria
- Check the consistency of the scores on each criterion



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Example

CRITERION OPTION	Urgency – already existing threats	Cost-benefit ratio	Covering multiple risks	Political and cultural acceptability	TOTAL	RANKING
<i>Weight 0 – 100</i>						
Adapt Option 1						
Adapt Option 2						
Adapt Option 3						
Adapt Option 4						
Adapt Option 5						



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Example

CRITERION OPTION	Urgency – already existing threats	Cost-benefit ratio	Covering multiple risks	Political and cultural acceptability	TOTAL	RANKING
<i>Weight 0 – 100</i>						
Adapt Option 1	80	45	60	60	245	2
Adapt Option 2	30	30	65	90	215	4
Adapt Option 3	100	50	30	70	250	1
Adapt Option 4	55	10	100	40	205	5
Adapt Option 5	60	75	80	25	240	3



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Weighting

- What's the value of one criterion compared to another
- Less important criterion receives lower score
- Weight on a criterion reflects the range of difference of the options, and how much that matters
- Standard approach is to allot scores between 0 and 100 to each criterion
- Giving weights often considered a difficult exercise



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Example

CRITERION OPTION	Urgency – already existing threats	Cost-benefit ratio	Covering multiple risks	Political and cultural acceptability	TOTAL	RANKING
<i>Weight 0 – 100</i>	<i>40</i>	<i>100</i>	<i>15</i>	<i>60</i>		
Adapt Option 1	80 (32)	45 (45)	60 (9)	60 (36)	122 – 30.5	3
Adapt Option 2	30 (12)	30 (30)	65 (10)	90 (54)	106 – 26.5	4
Adapt Option 3	100 (40)	50 (50)	30 (5)	70 (42)	137 – 34.2	1
Adapt Option 4	55 (22)	10 (10)	100 (15)	40 (24)	71 – 17.8	5
Adapt Option 5	60 (24)	75 (75)	80 (12)	25 (15)	126 – 31.5	2



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Sources

http://unfccc.int/adaptation/nairobi_work_programme/knowledge_resources_and_publications/items/5440.php

<http://climate-adapt.eea.europa.eu/adaptation-support-tool/step-4/prioritise-and-select>

<http://eprints.lse.ac.uk/12761/> (multi-criteria analysis manual)



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