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Multi Criteria Analysis as a tool for climate change adaptation assessment

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Outline

- Adaptation assessment
- MCA characteristics
- Review MCA applications
- Conclusions

Objectives

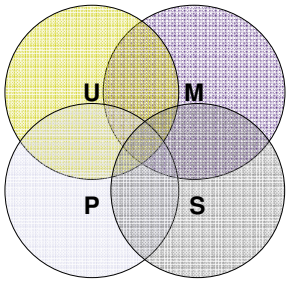
- Investigate key methodological issues
- Discuss MCA approaches
- Review of MCA empirical applications
- Discuss strengths and weakness

Adaptation assessment

- Global (IAM, GEM)
- National (finance and economics)
- Local (appraisal of measures)

Adaptation assessment challenges and characteristics

- Uncertainty
- Multidisciplinarity
- Participation
- Sustainability
  - Efficiency



Decision Support Tools for Adaption Assessment

- Cost Benefit Analysis (CBA)
- Cost Effectiveness Analysis (CEA)
- Multiple Criteria Analysis (MCA)

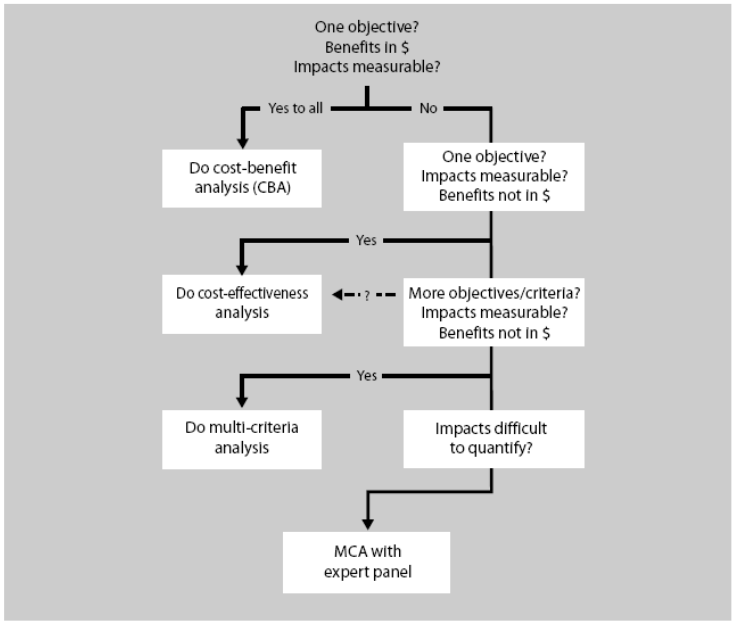
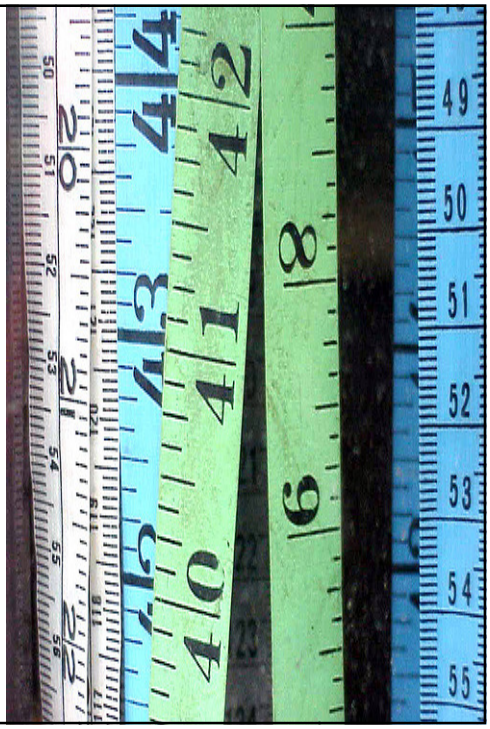


Figure 1: What method to use?
Note: "Benefits in $" means: benefits can be quantified and expressed in monetary units.

Source: UNFCCC, 2002

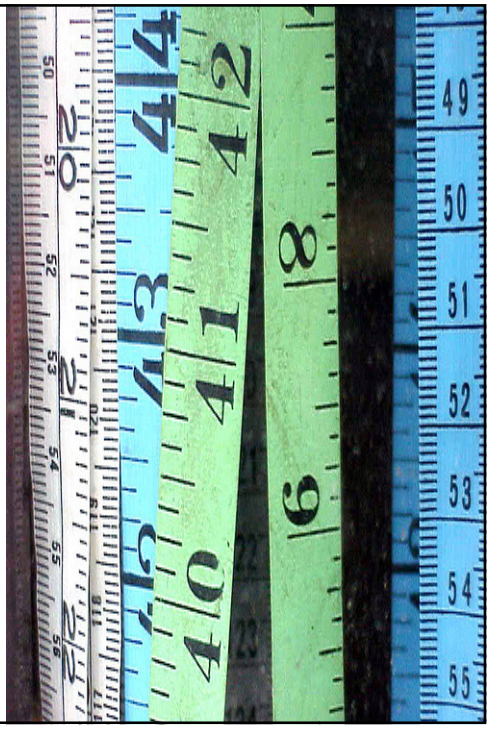
MCA emerging in:

- NAPAs
- Technology Needs Assessments
- Adaptation costs and benefits



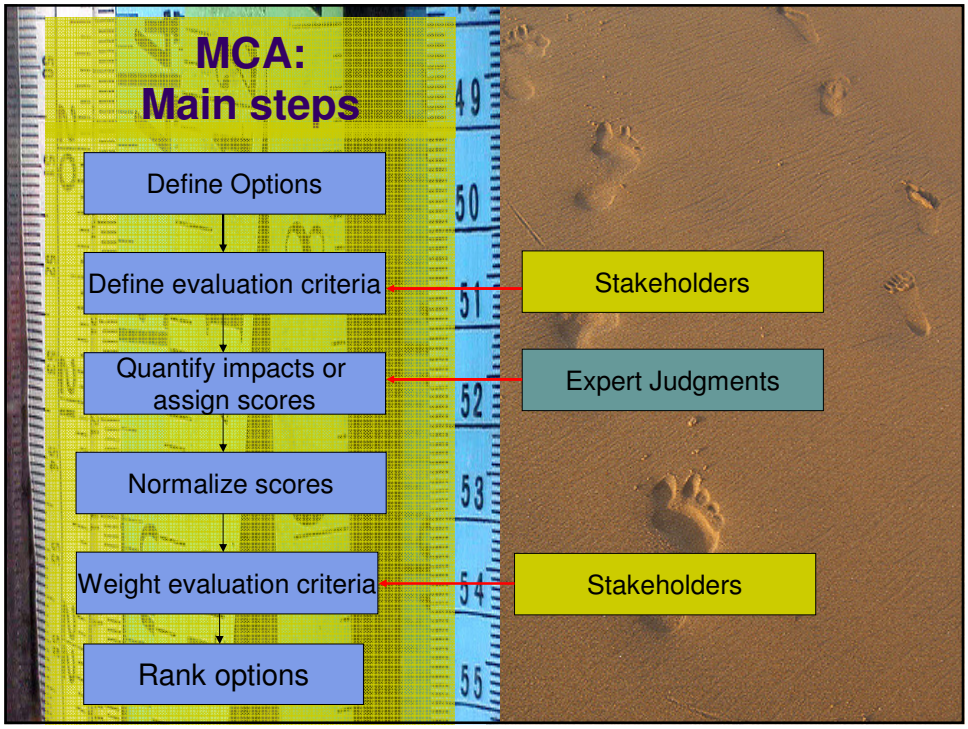
MCA: Structural elements

- Multiple Alternatives (at least two)
- Multiple – and often conflicting- Criteria
- Policy makers and multiple stakeholders



MCA: Type of decision problems

- Choice: Choose “best” option
- Ranking: Rank of alternative options
- Sorting: Sort alternative options



Review of studies

Review of MCA studies: Characteristics

	Year	Author	Country	Method	Evaluation Criteria	Options	Weighting: Stakeholders	Weighting: Analysts/ experts	Sectoral coverage	Scope	NAPAs
1	2010	Diarra et al	Mali	weighted summation	5	4	Direct		Agriculture	Rural	Y
2	2010	Haque et al	Bangladesh	weighted summation	7	7	Swing - direct		Flood management	Urban	
3	2009	Kubal et al	Germany		7			Direct	Flood management	Urban	
4	2009	UNFCCC (TNA)	Global	weighted summation	3 (categories)	numerous	Swing		Multiple	Rural	
5	2009	de Bruin et al	The Netherlands	weighted summation	5	numerous	Direct		Multiple	Rural	
6	2007	Haidera et al	Yemen		4	4	Direct		Water management	Rural	
7	2007	Debels et al	Chile	weighted summation	10	1	Direct	Direct	Disaster management	Urban	
8	2001	Dolan et al	Canada	weighted summation	6	3		Direct	Agriculture	Rural	
9	2000	Julius and Scherag	Egypt		7	5	Pairwise		Water, coastal,	Rural	
10	1998	Mizina et al	Kazakhstan		8	12		Direct	Agriculture	Rural	Y
11	1996	Smith et al	USA	weighted summation	6	3		Direct	Multiple	Multiple	

Characteristics of applications

- Recent years (70%)
- Variety of applications
- Simple and transparent methods

Methodological issues

MCA/Adaptation Assessment	Multidisciplinarity	Uncertainty	Participation	Sustainable Development
Multiple criteria	X			X
Multiple stakeholders			X	
Weighting			X	
Sensitivity analysis		X		

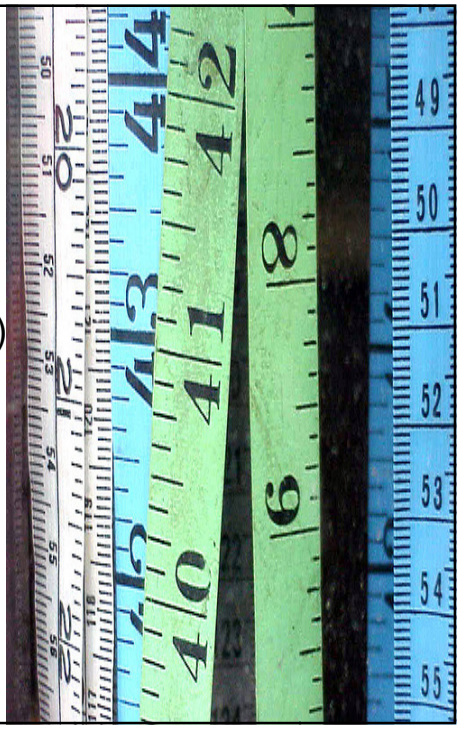
Review of MCA studies: Analysis of methodological issues

			Uncertainty	Participation		Focus		Policy cycle		Sustainability	Link with other methods
	Year	Author	Uncertainty	Stakeholders	Experts	Process/ Outcome	Output	Ex-ante	Ex post	Sustainability (objectives)	
1	2010	Diarra et al		Y		P-O	Ranking	x		Y	CBA
2	2010	Haque et al	Sensitivity analysis	Y	Y	P-O	Ranking	x		Y	
3	2009	Kubal et al			Y	O	Ranking	x		Y	GIS
4	2009	UNFCCC (TNA)	Sensitivity analysis	Y	Y	P-O	Screening - prioritization	x		Y	CEA
5	2009	de Bruin et al		Y		P-O	Screening-ranking	x			
6	2007	Haidera et al		Y		P-O	Ranking	x			Vulnerability assessment, scenario
7	2007	Debels et al	Sensitivity analysis		Y	P-O	Index		x	Y	
8	2001	Dolan et al		(potentially)		O	Ranking	x			
9	2000	Julius and Scheraga	Sensitivity analysis	Y	Y	P - O	Ranking - Best	x			
10	1998	Mizina et al	Sensitivity analysis		Y	P-O	Ranking	x		Y	CEA
11	1996	Smith et al			Y	O	Best	x		Y	CEA

	Year	Author	Strengths	Weakness
1	2010	Diarra et al	vulnerable groups involvement, multiple criteria consideration	
2	2010	Haque et al	communication, awareness about adaptation, cost effective prioritization	
3	2009	Kubal et al	multiple criteria, weighting	
4	2009	de Bruin et al	communication, awareness about adaptation, cost effective prioritization	
5	2007	Haidera et al	n.a.	n.a.
6	2007	Debels et al	structured, communication, quick assessment, cost - effective	subjective, aggregation of indicators
7	2001	Dolan et al	systematic, screening tool, provides direction to adaptation	
8	2000	Julius and Scher	transparency, communication	further work on performance of options
9	1998	Mizina et al	consensus building	subjective nature of scoring, transparency on scores
10	1996	Smith et al	systematic, easy and clear	

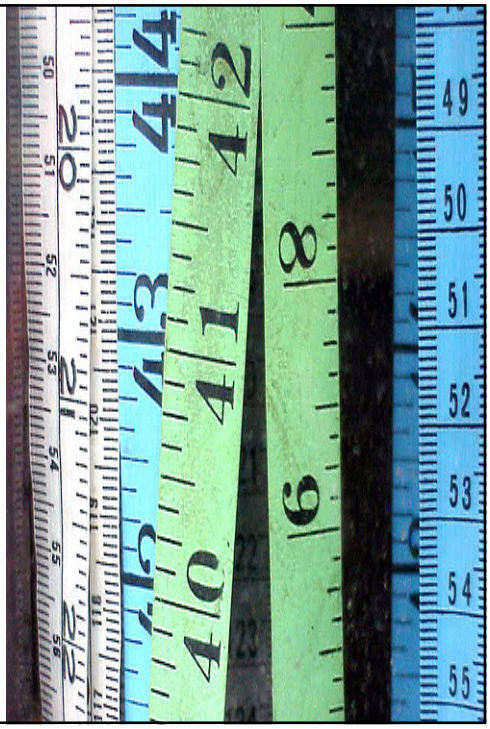
Strengths

- Communication tool
- Cost effective (efficient)
- Systematic screening
- Transparent
- Learning process



Limitations - Challenges

- Subjective nature of scoring
- Aggregation
- Time frame



Future research

- Link to vulnerability and impact assessments
- Application of different methods (e.g. weighting techniques)
- Combination of different tools (e.g CBA, MCA)
- More practical studies
- Consider time frames

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THANK YOU

Questions?

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" **MCA** is not a prescriptive answer but a transparent and informative **decision process** which helps to uncover people's intuitive decision procedures can be informed by a **structured rational** analytic process".