Ranking climate change adaptation options through multi-criteria analysis

Karianne de Bruin
Senior Research Fellow – CICERO

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Decision support tools

The Netherlands

India
Decision support tools

- Cost-benefit analysis
- Cost-effectiveness analysis
- Multi-criteria analysis
- Robust decision making
- Iterative risk (adaptive) management
- Portfolio analysis
- Real options analysis
- Iterative risk (adaptive) management
- Portfolio analysis
- Real options analysis
- Iterative risk (adaptive) management
- Portfolio analysis
- Real options analysis
Multi-Criteria Analysis

Approach that allows consideration of both quantitative and qualitative data in the ranking of alternative options

Systematic method for assessing and scoring options against a range of decision criteria
Approach (1)

- Identify alternative options
- Select criteria
- Scores options against criteria
- Assign weights to each criterion
- Calculate weighted sum
- Rank options

Approach (2)

<table>
<thead>
<tr>
<th>Urgency</th>
<th>Feasibility</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Strengths</td>
<td>Weaknesses</td>
<td></td>
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<td>-----------------------------------------------</td>
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<td></td>
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<tr>
<td>- Combine quantitative and qualitative data</td>
<td>- Subjective scoring and weighting</td>
<td></td>
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<tr>
<td>- Transparent and simple method</td>
<td>- Analysis of uncertainty</td>
<td></td>
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<tr>
<td>- Involvement stakeholders</td>
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</tbody>
</table>

**Application to adaptation**

- Consideration of relevant criteria
- Analysis with qualitative information
Multi Criteria Adaptation Assessment in the Netherlands

Background (1)

Routeplanner project

- Formulation of adaptation options
- A qualitative assessment of adaptation options
- A quantitative assessment of adaptation options
Background (2)

Project team

Environmental Economics and Natural Resources group – Wageningen University

In co-operation with: RIZA, RIKZ, ESA-WUR, Alterra, LEI, PRI, Erasmus University

Funding

BSIK program’s Climate change Spatial Planning, Living with Water, Habiforum

Governmental departments in cooperation with the Associations of Provincial Authorities, Netherlands Municipalities and Water Boards

Starting point

Climate change scenario relevant for the Netherlands for the period up to 2050

Source: KNMI, 2006
Methodology

- Identification of adaptation options
- Characteristics of the options
- Definition of criteria
- Determining the scores
- Determining the weights

MCA for ranking the adaptation options

Identification options

96 adaptation options identified

Sectors:
- Agriculture
- Nature
- Water
- Energy & Transport
- Housing & Infrastructure
- Health
- Recreation & Tourism
Criteria for scoring (1)

Evaluation criteria
- Importance
- Urgency
- No-regret characteristics
- Co-benefits
- Effect on mitigation

Criteria for scoring (2)

Feasibility criteria
- Technical complexity
- Social complexity
- Institutional complexity
Scoring

Options scored on evaluation and feasibility criteria by experts

<table>
<thead>
<tr>
<th>Adaptation option</th>
<th>Temperature</th>
<th>Precipitation</th>
<th>Extreme weather events</th>
<th>Other</th>
<th>Sea level rise</th>
<th>River discharge</th>
<th>Other pollution level</th>
<th>Heat stress</th>
<th>Drought stress</th>
<th>Growth stress</th>
<th>Importance</th>
<th>Urgency</th>
<th>No regret</th>
<th>Co-benefits</th>
<th>Mitigation effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>x</td>
<td>x</td>
<td>x x x x</td>
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<td>5</td>
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<td>02</td>
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Ranking

Ranking based on ordered criteria (e.g. 1 urgency, 2 importance, etc.)

Ranking based on criteria weighting (e.g. 40% importance, 20% urgency)
Database

Results (1)

Highest priority (weighted summation)
- Integrated nature and water management
- Integrated coastal zone management
- More space for water
- Risk based allocation policy
- Risk management as basic strategy
- New institutional alliances
- Design and implementation of ecological networks
- Construct buildings differently
- Change modes of transport
- Make existing and new cities robust
Results (2)

Lowest priority (weighted summation)
- Subsoil drainage of peat lands
- Reclamation of (part of) southern North Sea
- Abandoning of the whole of low-lying Netherlands
- Self sufficiency in production of roughage

Follow-up

National Strategy on Adapting Spatial Planning to Climate Change (ARK), with the aim of ‘climate proofing’ the Netherlands

From the National Adaptation Strategy to the Deltaprogramme, where the Dutch government formulated new priorities in the field of adaptation to climate change

http://www.climateresearchnetherlands.nl/ARKprogramme
Participatory assessment of adaptation options, India

Background (1)

Pilot project ‘Extreme risks, vulnerabilities and Community-Based Adaptation (EVA)’ in India

Impacts of extreme weather events on agriculture and water resources in the drought-prone Jalna district, Maharashtra
Background (2)

Five partners in consortium: AFPRO, TERI and CIENS (NIBR, CICERO, NIVA)

Funded by the Norwegian Embassy, New Delhi

Participatory assessment

- Long-list of 26 adaptation options identified, focused on agriculture, water and social development
- Definition of criteria
- Block-level officers and at village cluster level rank criteria and score adaptation options
Field work

![Field work images](Image)

Preliminary results (1)

- Construction of water conservation structures
- Educating youth
  
  - Integrated farming system
  - Ground water regulation
  - Water budgeting
Preliminary results (2)

- Water conservation
- Drip irrigation
- Women’s capacity building
- Strengthening of self-help groups for credit

Multi-criteria analysis
### Summary

- Decision-support tool to assess and rank adaptation options
- Broad applicability
- Combine with economic assessment of costs and benefits

### Strengths

- Combine quantitative and qualitative data
- Transparent and simple method
- Involvement of experts and stakeholders

### Weaknesses

- Subjective scoring and weighting
- Analysis of uncertainty
References


Thank you for your attention

Contact details: karianne.debruin@cicero.oslo.no