

CLimate ACTions Prioritization (CLIMACT Prio) Capacity Building and Decision Support Tool



Climate Actions Prioritisation Tool CLIMACT Prio



Institute for Housing and Urban Development Studies (IHS)

Training Manual v.3

Introduction

The need to tackle the risks posed by the impacts of climate change to development and poverty reduction goals has spurred a growing range of tools to integrate adaptation into development co-operation and planning. For a long time development planners and project managers have used a wide variety of tools to manage a broad range of environmental risks, including those posed by climate variability. Some of these tools have also now been modified to take into account the risks posed by climate change.

At the same time, there has been a recent emphasis on developing more dedicated tools which have an explicit focus on screening for climate change risks and on prioritizing adaptation actions in order for local governments to conduct local climate change adaptation action plans.

These kind of tools can be used both for informative decision making and capacity building purposes. It is within this set of tools that CLIMACT Prio tool was developed. CLIMACT Prio Tool targets local governments, urban planners, municipality officials, city managers and academic and research institutions in the field of climate change in urban areas.

Description

CLIMACT Prio is a climate awareness, decision support and capacity building tool for screening and prioritizing of local climate change actions. CLIMACT Prio utilizes a multi-criteria approach to assist decision makers and urban planners to identify a wide range of decision criteria and set priorities among objectives while performing an analysis and assessment of climate change (mitigation or adaptation) actions.

This method does not necessarily identify an “optimal” option, but rather requires the user to draw conclusions by looking at different components of the whole picture of the assessment and prioritization process, while seeking a consensus decision between stakeholders with different needs, concerns, and priorities.

CLIMACT Prio tool provides an interactive format to help users structure and define the decisions under consideration. The tool asks the user to enter information through a guided menu of instructions and uses a menu-driven graphic representation of results for the evaluation of climate change actions.

The user first identifies specific actions to be screened according to their feasibility and then selects the impact assessment criteria and objectives that will be used to assess the selected actions. While following the climate actions prioritization process, the users rates the relative importance of criteria and assign scores (qualitative and quantitative) to describe how each option meets each criterion.

Objectives and Aims of the Tool

The aim of this tool is to provide support to decision makers to identify and prioritize local adaptation actions at a city level (at a given case). The analysis is undertaken not only to identify adaptation actions but also to prioritize which actions should be implemented first (prioritization). CLIMACT Prio tool applies a Multi Criteria Analysis (MCA) evaluation.

MCA is a multi-step analysis based on the synthesis of already existing vulnerability assessment studies. The results from this analysis will assist the decision-making process in choosing priority adaptation actions.

The purpose of this analysis is not to assess the vulnerability a new, but to bridge the gap between existing scientific knowledge and the decision-making process based on available information. In addition, by following this approach other objectives (criteria) such as local development benefits are identified.

The User's Manual of the CLIMACT Prio tool will guide you through the various steps of the analysis and can assist you to present the results of the assessment in a graphical form.

How to use this manual

If you already have a CLIMACT Prio tool

This manual is provided for users of the CLIMACT Prio tool who are starting with a populated CLIMACT Prio tool for their city. It is designed to guide analysis using the tool and help with the interpretation of results.

If you are starting from a “blank” CLIMACT Prio tool

This manual provides a useful demonstration of the kind of analysis that can be produced using the CLIMACT Prio tool. Before embarking on any analysis we would recommend a thorough review of this document. The experience of the cities involved in using the CLIMACT Prio tool is likely to be valuable in developing the approach to selecting adaptation actions and engaging local stakeholders.

Tool's Set Up

- To run CLIMACT Prio, the user needs Microsoft Windows Office 2007 and Microsoft Excel 2007. The tool is not guaranteed to work correctly in other versions of Excel. The tool uses Excel Macros that need to be enabled in order the tool to operate correctly with automated features.
- In order to protect against the introduction of accidental errors we recommend that users keep a “safe” version of the tool separate from the working version(s). We also recommend that users save their work frequently and regularly save backup copies of working files in order to track changes and to protect against the introduction of errors.
- The CLIMACT Prio tool allows users to estimate and compare performance of different actions/measures against several criteria. A droplist of actions and measures is under development and will be stored in the Excel workbook where users can choose some of these and fully incorporate them into the CLIMACT Prio analysis.

Structure of the tool

The CLIMACT Prio tool is structured in six main steps:

- 1) **Identification of preliminary wish-list of actions** based on cities vulnerability profiles, broader development goals and visions (this step forms the basis to use the tool)
- 2) **Feasibility Assessment:** Consists in the screening of each action identified in the wish-list against pre-defined feasibility criteria and formulation of a shortlist of actions to take further into the assessment
- 3) **Evaluation Criteria Identification:** Based on city vulnerability profiles, broader development goals and the preliminary list of adaptation actions, evaluation criteria are identified.
- 4) **Impact assessment:** Consists of experts' judgments and impact assessment matrix along with normalized scores and graphs;
- 5) **Weighting of criteria:** Consists in the weighting of criteria by the stakeholders and the generation of relevant graphs;
- 6) **Results:** Consists of the presentation of weighted scores, final ranking and the generation of relevant graphs

Step 1b – Screening and ranking of alternative adaptation actions (2 hours)

Narrow down the initial long list of alternative adaptation actions identified in Step 1a through an initial screening process. This task will screen out adaptation actions that may not be viable to implement will bring forward alternative adaptation actions for a more detailed assessment.

- First study the following feasibility and impact criteria – with their corresponding descriptions and scoring scale - adapted from UN Habitat (2014)

	Criteria	High	Medium	Low
Feasibility Criteria	Stakeholder acceptability: <i>Would local residents accept it?</i>	Majority of residents in area	Limited majority	Low support
	Technical feasibility: <i>Will necessary design, implementation and maintenance support be available for the option?</i>	Design available	Resources to develop design, implement and maintain	No available resources to develop, design, implement and maintain
	Ease of implementation: <i>Can it be implemented at the local government level, or does it depend upon state/provincial or national support?</i>	City can implement this without external support	City can implement this with some support	City cannot implement this without external support
	Financial viability: <i>Is it a financially realistic option? Does the city have funding or potential access to funding to cover the costs?</i>	Financially realistic with available funding	More limited funding opportunities	Expensive and limited funding opportunities
	Mainstreaming potential: <i>Could it be integrated with existing local government planning and policy development?</i>	Yes, easily and fully through many plans and strategies	Yes, partly but with more time and through more limited plans and strategies	Relatively limited potential, would require additional activities
	Impact Criteria	Effectiveness: <i>How well would it work on reducing vulnerability (in relation to the other actions)?</i>	Vulnerability will be reduced to a large extent (in relation to the other actions)	Vulnerability will be reduced to a moderate extent (in relation to the other actions)
Multi-sectoral and multi-objective: <i>Would it address objectives in other sectors?</i>		Yes, significant cross over with other sectors and objectives	Some cross over with other sectors and objectives	Little cross over with other sectors and limited impact on other objectives

- Evaluate each alternative adaptation option against each of the seven (7) feasibility and impact criteria by providing a score using the following scale: High, Medium, Low
- The evaluation should be based on your research, done in class, related to the feasibility and impact of identified adaptation options. The research can be based on experiences from other

cities, best practices, scientific studies published in academic journals, government reports and official institutions' blogs.

Step 1b: Feasibility Assessment - Initial Screening of Adaptation Actions

Adaptation Actions	Feasibility criteria					Impact Criteria	
	Acceptability	Technical Feasibility	Implementation Ease	Financial feasibility	Mainstreaming Potential	Effectiveness	Multiple Benefits/Sectors
Retrofitting of drainage system	Low	Low	Low	Low	Low	Low	Low
Raised road	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Embankment	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Flood wall	Very High	Very High	Very High	Very High	Very High	Very High	Very High
Protection of water retention areas	Very High	Very High	Very High	Very High	Very High	Very High	Very High
Canal Improvement	Very High	Medium	Very High	Very High	Very High	Very High	Very High

Figure 2 Example of initial screening of adaptation actions. Rank each action against both feasibility and impact criteria

Step 1c: Feasibility ranking of adaptation actions

At the end of step 1b observe how all the scores for each alternative adaptation action add up, as well as the overall ranking of the adaptation actions and the feasibility index (the index that captures the average score over the five feasibility criteria). You can choose to use the outcome of the feasibility index as a criterion in your impact matrix in Step 4.

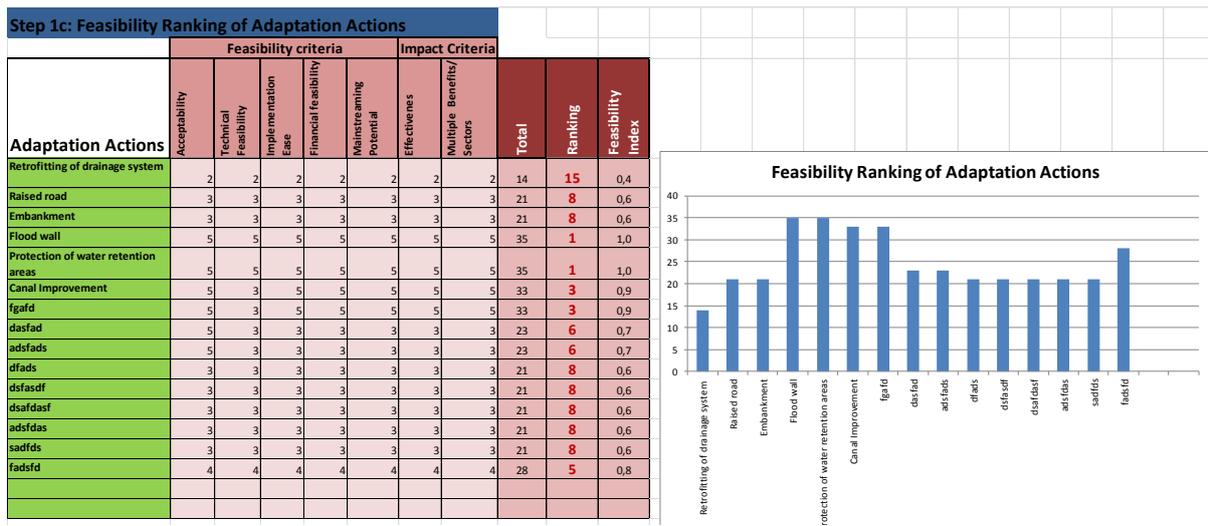
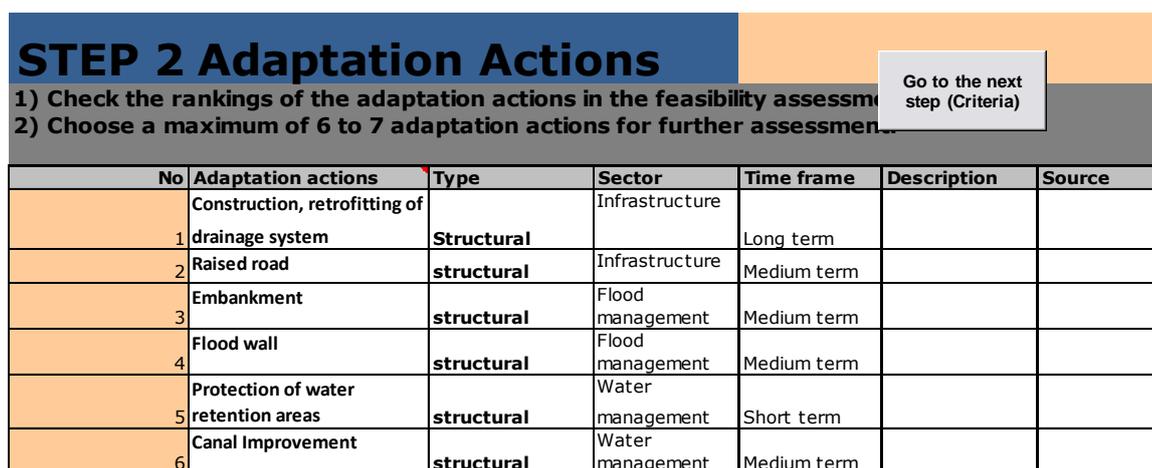


Figure 3 Example of feasibility ranking of adaptation actions

Step 2 - Selection of Adaptation Actions (1 hour)

Based on the adaptation actions that ranked the highest in the feasibility assessment, choose a maximum of **6 to 7** adaptation actions to carry on in this exercise and copy/paste them in Step 2. Please also fill in the feasibility part of the Climate Action template provided. In a real training situation, trainees should also fill in the feasibility part of the climate action template provided, where they will explain the outcomes of the feasibility and provide justifications for each selected action.



STEP 2 Adaptation Actions

1) Check the rankings of the adaptation actions in the feasibility assessment
 2) Choose a maximum of 6 to 7 adaptation actions for further assessment...

Go to the next step (Criteria)

No	Adaptation actions	Type	Sector	Time frame	Description	Source
1	Construction, retrofitting of drainage system	Structural	Infrastructure	Long term		
2	Raised road	structural	Infrastructure	Medium term		
3	Embankment	structural	Flood management	Medium term		
4	Flood wall	structural	Flood management	Medium term		
5	Protection of water retention areas	structural	Water management	Short term		
6	Canal Improvement	structural	Water management	Medium term		

Figure 4 Shortlist of Adaptation Action as a result of the screening phase

Step 3 - Selection of criteria evaluation

The user should define the evaluation criteria that will be used in the CLIMACT Prio tool to evaluate and prioritize the actions. The evaluation criteria can be diverse in nature: they may be selected unilaterally or through a group discussion with the various stakeholders. Especially, if the analysis will be done in a participatory manner, the criteria should be simple and understandable by all stakeholders. Try to avoid overlap between criteria but also identify a comprehensive set of evaluation criteria. This step is important, as the final prioritization of the actions will be determined based on the selected evaluation criteria.

The user is requested to indicate the following features:

- Define a **max of 7** evaluation criteria based on the instructions given to the user in the spreadsheet (see Fig. 5)
- Define the **category** of criteria (see Fig. 6)
- Define a **measurement scale**. For training purposes a qualitative scale from “1 to 10” or “1 to 5” where 1 indicates very low performance and 10 (or 5) very high performance of the actions can be utilized (see Fig. 7)
- The preference for each criterion, namely if the score at this criterion should be maximized or minimized

STEP 3: CRITERIA identification

1. Define evaluation criteria
2. Specify their respective category
3. Specify the unit of measurement
4. Specify the direction of preference (Min/Max)

Next Step
(Scores)

	Task 1	Task 2	Task 3	Task 4	
	Criteria	Category of Criteria	Units	Min/Max	
Introduction	1	Vulnerability reduction	Climate	%	Max
Step 1: Vulnerability		Vulnerability reduction	Economic	euros	Min
Step 2: Actions		Costs	Feasibility	"1 - 5"	Min
Step 3: Criteria		Institutional and technical capacity	Social	"1 - 5"	Max
Step 4: Scores		Public and political acceptance			
Step 5: Weights		Achievement of MDGs	Social	"1 - 5"	Max
Step 6: Results		Employment generation	Economic	"1 - 5"	Max
Step 7: Sensitivity		Enhancement of ecological condition	Environmental	"1 - 5"	Max
		Other			

Welcome / Vulnerability / Actions / Criteria Instructions / **Criteria** / Scores Instructions / Scores-Experts / Scores (Av) / ...

Figure 5 Criteria Identification: The user should define the evaluation criteria, choosing from the given options or adding more options where appropriate

Criteria	Category of Criteria	Units	Min/Max
Vulnerability reduction	Climate	%	Max
Costs	Environmental Economic Social	euros	Min
Institutional and technical capacity	Climate Feasibility Financial	"1 - 5"	Min
Public and political acceptance	Social	"1 - 5"	Max
Achievement of MDGs	Social	"1 - 5"	Max
Employment generation	Economic	"1 - 5"	Max
Enhancement of ecological condition	Environmental	"1 - 5"	Max

Welcome / Vulnerability / Actions / Criteria Instructions / **Criteria** / Scores Instructions / Scores-Experts / Scores (Av) / normalized Scores / G
 Figure 6 Evaluation Criteria: The user should choose the category of the criteria amongst the available options

Criteria	Category of Criteria	Units	Min/Max
Vulnerability reduction	Climate	%	Max
Costs	Economic	% "1-3" "1-5"	Min
Institutional and technical capacity	Feasibility	"1-10" euros \$	Min
Public and political acceptance	Social	m2 hectares	Max
Achievement of MDGs	Social	"1-5"	Max
Employment generation	Economic	"1-5"	Max
Enhancement of ecological condition	Environmental	"1-5"	Max

Welcome / Vulnerability / Actions / Criteria Instructions / **Criteria** / Scores Instructions / Scores-Experts / Scores (Av) / normalized Scores / Graphs-Rt
 Figure 7 Evaluation Criteria: The user should define the unit of measurement for each criterion and decide whether to maximize or minimize it

Step 4 – Scoring of adaptation actions (Impact Assessment Matrix)

The user must assign scores for each adaptation action against the selected evaluation criteria. Normally, this step is based either on economic, social, environmental and adaptation impact studies or on experts' judgments as well as modeling exercises. To minimize ambiguity and subjectivity, scoring should be done based on a clearly understood and agreed upon scale. In this regard, a smaller scoring scale is easier to use and is less subjective than a larger scale.

For instance, values of 55 to 80 could denote an important impact on a scale of 0 to 100, whereas 2 is the only value available on a scale of 1 to 3. The importance of a smaller scale is even greater when the analysis is conducted in a participatory manner. Furthermore, there are some criteria, e.g. financial costs or physical damages that can be easily expressed using precise units (monetary or other physical units).

STEP 4: SCORING - Impact Assessment Matrix							Next Step (Normalized Scores)
Indicate the scores for each alternative on every criterion							
Options/Criteria	Vulnerability reduction	Cost	Institutional and Technical Capacity	Acceptance	Achievement of MDGs	Employment	
Scale units	"1-10"	"1-10"	"1-5"	"1-5"	"1-10"	"1-10"	
	Max	Min	Min	Max	Max	Max	
Construction, retrofitting of drainage system	5	5	2	2	5	5	
Raised road	6	6	3	3	8	3	
Embankment	7	7	4	4	3	7	
Flood wall	5	8	5	5	6	4	
Protection of water retention areas	3	3	1	1	1	3	
Canal Improvement	4	4	2	2	4	4	

Figure 8: Impact Assessment Matrix (with qualitative scoring)

- During training or educational exercises only qualitative units of measurement will be used, where 1 indicates worst performance and 5 indicates best performance (in terms of costs it indicates a less costly action)
- It should be noted that criteria that need to be minimized (e.g. costs) will automatically be assigned a negative sign in the Impact Assessment Matrix (only when quantitative units of measurement are used, e.g. monetary)

Notes on Standardization (performed automatically by the tool)

Since selected criteria do not all use the same scoring scale, one must standardize the values in order to be able to compare the scores. Standardization can be done on a 0 to 1 or to a 0 to 100 scale. Standardization is done by linear interpolation. The standardization is being performed automatically for this exercise by the CLIMACT Prio tool. Verify that all the criteria scores are in the same direction (i.e. that higher numbers represent a positive outcome and lower numbers represent less positive or negative outcomes or vice versa).

For instance, when scoring for costs and benefits one must ensure that the action with the greatest benefits receives the highest positive score, while the option with the greatest costs receives the lowest score (as this is a negative attribute). All the scoring scales must be in the same direction (from negative to positive values). The standardization is performed automatically by the CLIMACT Prio tool. Observe the graphs obtained based on the normalized initial results (See Fig. 9)

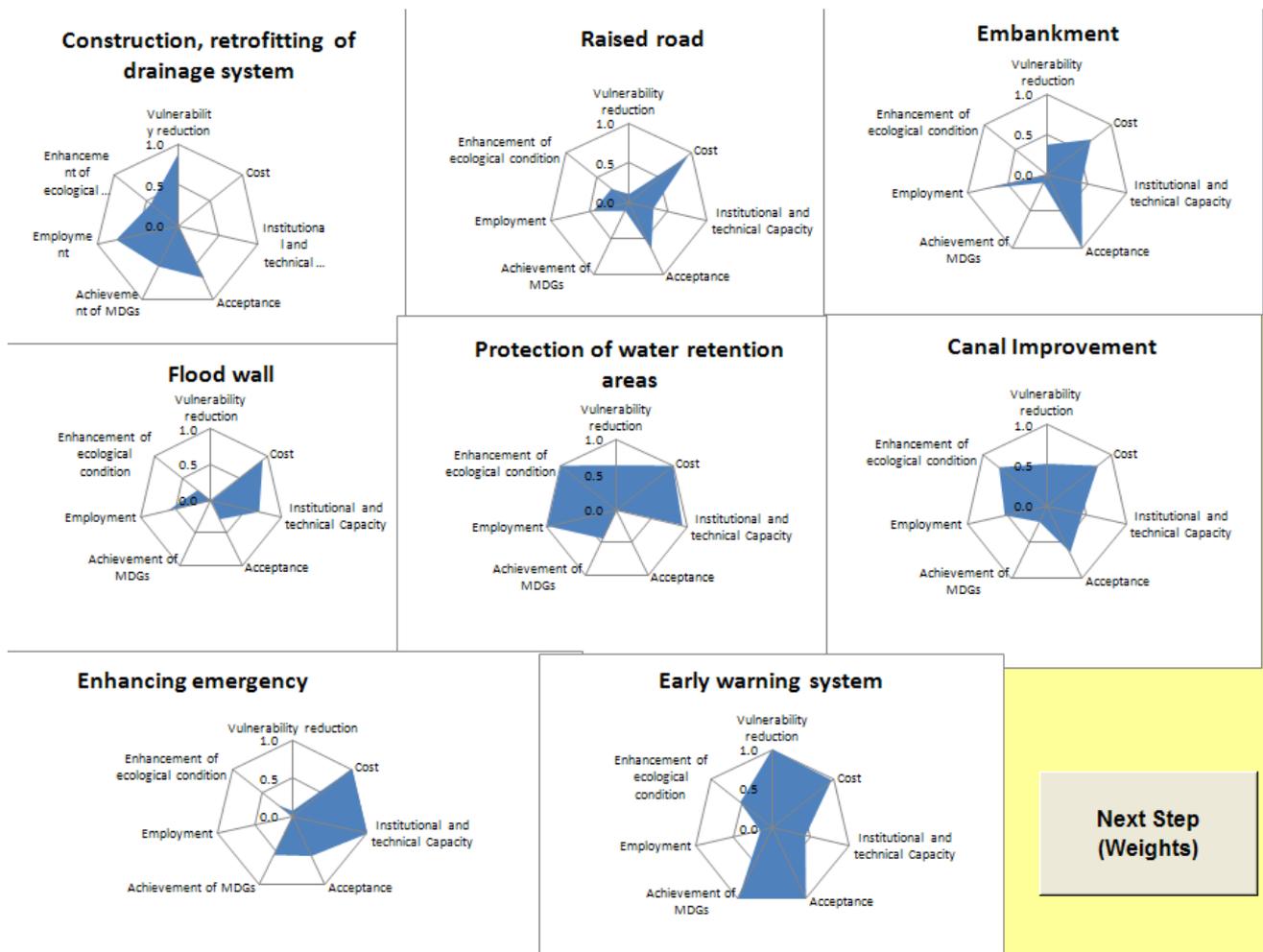


Figure 9 Radar Graphs produced by Step 4 visually show the normalized scores for each adaptation action

Step 5 – Weighting of criteria

In this step, the stakeholders must decide if any of the criteria should be given a higher or lower weight with respect to others. Weighting of criteria should be at the heart of group discussions, as it may change the ranking of adaptation actions. The first weighting spreadsheet called ‘W-stakeholders’ can accommodate 8 different (groups of) stakeholders.

If the ranking of adaptation actions changes as a result of modifying the criteria weights, stakeholders should analyze and discuss the results to ensure that everyone agrees on certain weights (factors of relative importance) and the final ranking of adaptation options. The weighting process includes the following steps which the user is requested to follow:

- Rank the criteria from most important to least important. The most important (first ranked) criterion will be rated by 1, second most important criterion by 2 and so on.
- The user then should indicate the weighting preferences verbally by choosing the level of importance using the drop down list on the scale: very low, low, moderate, high, very high (See Fig. 10)
- Furthermore the user should indicate her/his weighting preferences also arithmetically from the drop down list. For each type of verbal expression of her/his preferences there is a short arithmetic range that is associated with. (See Fig.11 and table 1)

- After all (groups of) stakeholders expressed their weighting preferences, the CLIMACT Prio calculates the average weighting factors along with the degree of convergence of stakeholders (see Fig. 12). This index indicates the level of agreement between stakeholders' preferences regarding criteria weights expressed as the Standard Deviation (StDEV). The smaller the percentage the greater the convergence, implying that criteria with high percentages will need further consultations between stakeholders to avoid later conflicts.

Verbal scale	Arithmetic scale
Very high	90 - 100
High	70 - 80
Moderate	50 - 60
Low	30 - 40
Very low	10 - 20

Table 1: Verbal and arithmetic scales of criteria weighting

1. Examine carefully the criteria and indicate the level of importance of criteria verbally from "very low" to "very high"
 2. Examine carefully the criteria and assign a value denoting difference in importance (100 is assigned to the most important criterion)

Category of Criteria	Criteria	Units	Impact Range	Stakeholder 1				Stakeholder 2				
				Task 1	Task 2	Task 3	Task 1	Task 2	Task 3			
				Rank	Importance	Values	Weights	Rank	Importance	Values	Weights	
1	Climate	Vulnerability reduction	%	19,3	2	Very High	100	22,7%	1	Very High	100	21,3%
2	Economic	Costs	euros	63,7	6	High	80	18,2%	3	Very High	90	19,1%
3	Feasibility	Institutional and technical capacity	"1-5"	2,3	7	Moderate	60	13,6%	5	High	80	17,0%
4	Social	Public and political	"1-5"	2,0	1	Moderate	60	13,6%	2	High	80	17,0%
5	Social	Achievement of MDGs	"1-5"	1,3	3	Low	30	6,8%	4	Moderate	60	12,8%
6	Economic	Employment generation	"1-5"	1,9	5	Low	40	9,1%	7	Low	40	8,5%
7	Environmental	Enhancement of ecological	"1-5"	3,0	4	High	70	15,9%	6	Very Low	20	4,3%

Figure 10 Weighting Criteria: Users provide weighting (relative importance) preferences verbally by indicating the level of importance using the choices in the drop-down window

Category of Criteria	Criteria	Units	Impact Range	Stakeholder 1				Stakeholder 2				
				Task 1	Task 2	Task 3	Task 1	Task 2	Task 3			
				Rank	Importance	Values	Weights	Rank	Importance	Values	Weights	
1	Climate	Vulnerability reduction	%	19,3	2	Very High	100	22,7%	1	Very High	100	21,3%
2	Economic	Costs	euros	63,7	6	High	80	18,2%	3	Very High	90	19,1%
3	Feasibility	Institutional and technical capacity	"1-5"	2,3	7	Moderate	60	3,6%	5	High	80	17,0%
4	Social	Public and political acceptance	"1-5"	2,0	1	Moderate	80	3,6%	2	High	80	17,0%
5	Social	Achievement of MDGs	"1-5"	1,3	3	Low	30	6,8%	4	Moderate	60	12,8%
6	Economic	Employment generation	"1-5"	1,9	5	Low	40	9,1%	7	Low	40	8,5%
7	Environmental	Enhancement of ecological condition	"1-5"	3,0	4	High	70	15,9%	6	Very Low	20	4,3%

Figure 11 Weighting Criteria: For each type of verbal expression of stakeholder’s preference there is a short arithmetic range that is associated with it. In this example “Moderate” importance corresponds to arithmetic values from 50 to 60



Figure 12 Criteria weights, degree of convergence and final pie charts with importance of criteria

Step 6: Results

The scores given by the experts are combined with the weights elicited by the stakeholders in order to estimate automatically the weighted scores. This calculation results in the final score of each option. This is based on the weighted summation formula while the ranking of adaptation options is determined automatically by the tool (Fig. 13).

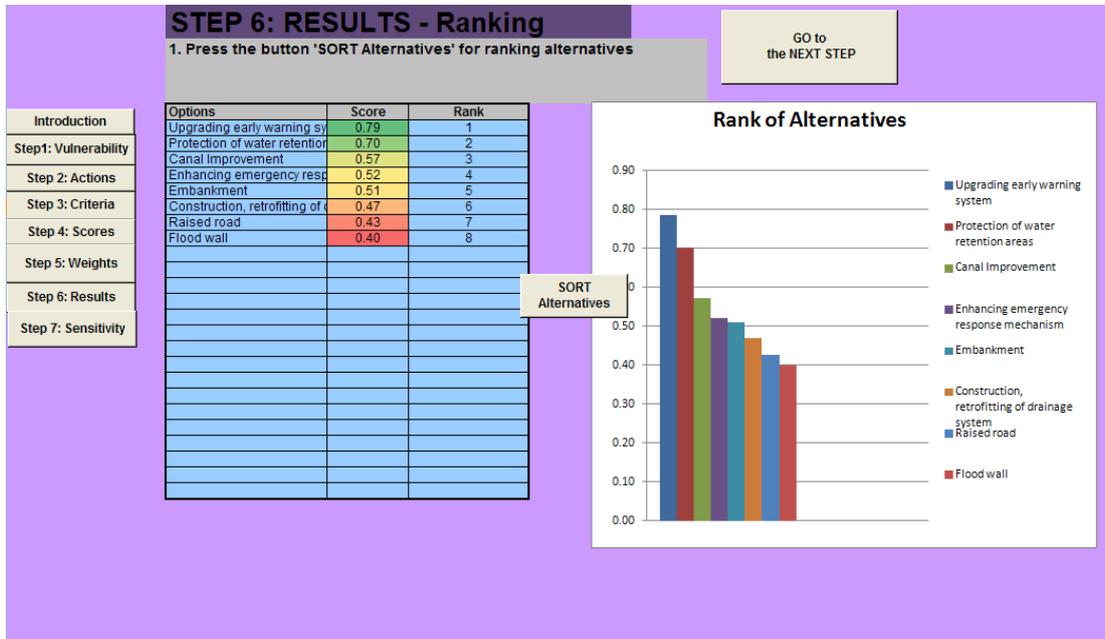


Figure 13 Results – Rank of actions

The tool generates also automatically two types of graphical representations of the results as follows:

- 1) Rank of actions from highest ranked to least ranked (Fig.13).
- 2) Rank of actions depicting also the criteria contribution to the final score/performance of each action (Fig.14)

Observe the results and reflect on the following:

- How can the final ranking be explained?
- Which criteria contribute the most to the highest ranked alternatives?
- Which criteria (objectives) will be met by the highest ranked alternatives?
- What does this prioritization of adaptation actions imply for the city's climate adaptation policy?

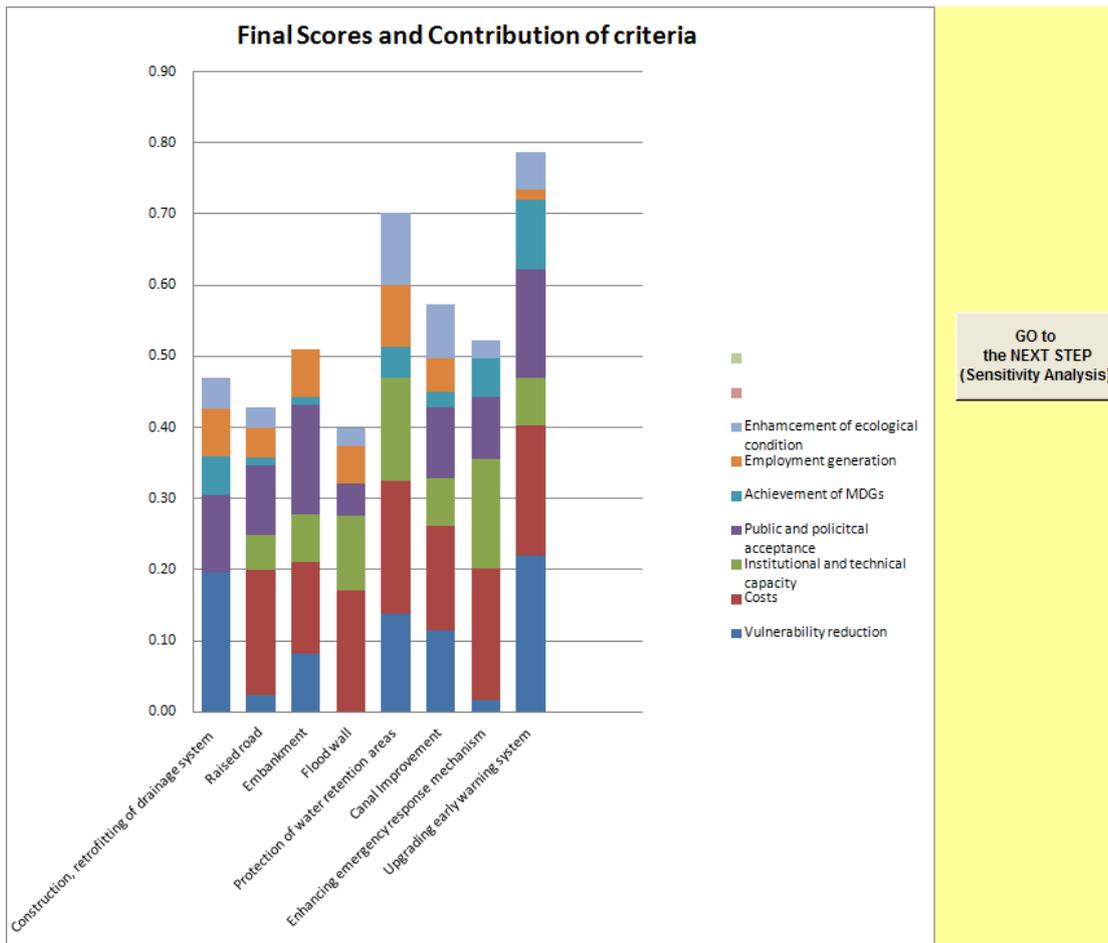


Figure 14 Final scores and contribution of criteria to each adaptation option

General Advice: For every step of the exercise, always discuss with your group mates and use graphical means (e.g. board, paper) in order to communicate your ideas and perspectives. Decide as a group how to address and answer the questions at every step of the exercise and finally fill in the relevant information to the CLIMACT Prio Tool.

Important Note: Please do not delete or add any rows or columns while working with the CLIMACT Prio tool.

Concluding Remarks

CLIMACT Prio is a climate awareness, decision support and capacity building tool for assessment, screening and prioritization of climate mitigation and adaptation actions. CLIMACT Prio applies a multi-criteria analysis (MCA) to assist decision makers and urban planners to identify a wide range of decision criteria and set priorities among objectives.

MCA structures and facilitates stakeholders' involvement in the decision process, which is likely to increase the quality of decisions. This approach stimulates discussions and helps decision makers better comprehend the decision problem, the values and priorities of themselves and of the stakeholders.

By exchanging information on adaptation criteria, collecting data, stakeholders acquire new knowledge and by doing so also identify information gaps to be addressed for the optimal use of CLIMACT Prio Tool.

For detailed information on the application of CLIMACT Prio tool, please contact IHS Climate Change Specialists Stelios Grafakos (s.grafakos@ihs.nl) and Veronica Olivotto (Olivotto@ihs.nl)

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