

OPTamos

**(Options for Participatory Transformation
and Management of Sustainable land use)**

Step-by-step user guide

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1. Introduction

A Multi-Criteria Assessment (MCA) method is a tool designed to support decision-making processes. The advantage of MCA is that it allows comparison of different options, assessed through certain criteria using different units (Grimble and Wellard, 1997; Pereira and Quintana, 2002; Russi, 2007). Orthodox MCA is a tool assisting a single decision maker, which does not consider perceptions of other social actors (Grimble and Wellard, 1997). Thus, in order to turn MCA into a participatory approach to ease decision making as a social process, the concept of Social Multi-Criteria Evaluation (SMCE) was developed to take into account this hitherto missing social dimension (Russi, 2007).

There is a wide range of software tools on the market to perform multi-criteria assessments (either MCA or SMCE), but each tool has been adjusted to meet the needs of a particular field of research or even a particular step within a decision process (Buchholz et al., 2009). Within the European Collaborative Project ROBIN (Role of Biodiversity in Climate Change Mitigation; FP7-ENV-2011.2.1.4-1) we therefore felt the need for a software tool that would be able to perform a full SMCE analysis with a user-friendly interface. However, such a tool could not be found on the market. This situation motivated the research team in charge of the SMCE process (Institute of Social Ecology, Vienna, from the University of Klagenfurt) to develop the easy-to-use and simple-to-access software tool named OPTamos (Options for Participatory Transformation and Management of Sustainable land use).

OPTamos has been designed for use by land managers, decision makers, consultants, researchers, and other stakeholders working at local and regional level (i.e. land owners, local or regional government institutions in charge of land management, consulting companies, etc.). This tool is based on the Analytical Hierarchy Process (AHP) method (see Saaty, 1980), which combines information provided by stakeholders and produces a ranking of optional pathways.

The information that needs to be introduced in OPTamos to perform an analysis concerns the following:

- Goal: defines the aim of the analysis. It is established by the team in charge of the decision making process.
- Options: refers to available alternatives. A list of possible options is elaborated by the team in charge of the process following a thorough literature research, expert consultation and policy analysis.
- Criteria: are guiding elements on which decisions are based. An initial list is generated by the team in charge of the process and finalised after stakeholder consultation.
- Weights: indicate the relative importance of the different components of the SMCE process. The weights needed to evaluate the different options are provided by the relevant stakeholders through public consultation, workshops, interviews, and the like.

2. Step 1: Access to OPTamos software tool

OPTamos is an online tool that can be accessed free of charge from the following website:

<http://robin-decisionsupport.aau.at/aaahp/authenticated/detail.xhtml>

After entering the address into any web browser, the user is presented with a login screen to access the main programme (Figure 1). This registration process allows users to access and save the analysis they carry out in a confidential manner.

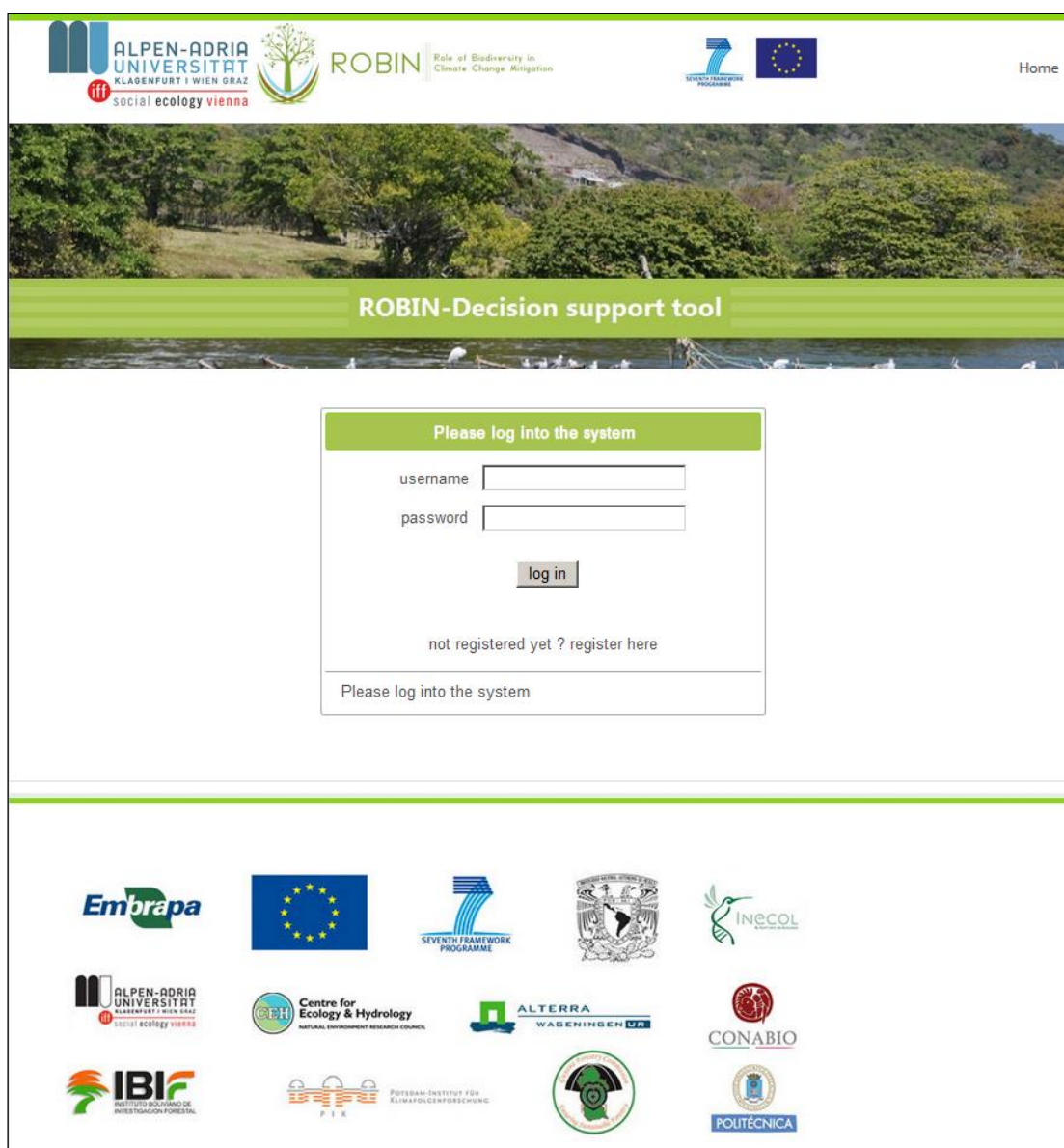


Figure 1. Access screen of OPTamos software tool.

The first time users access the software, they must register with *username* and *password* of their choice. This step allows to save the analysis at any stage of the process and return at any later stage. Users can create as many different analyses as they wish within a registered profile.

To proceed with the initial registration, users must click on the word *here* (Figure 2) shown in the access screen. A new window opens showing all the data needed for registration (Figure 3).

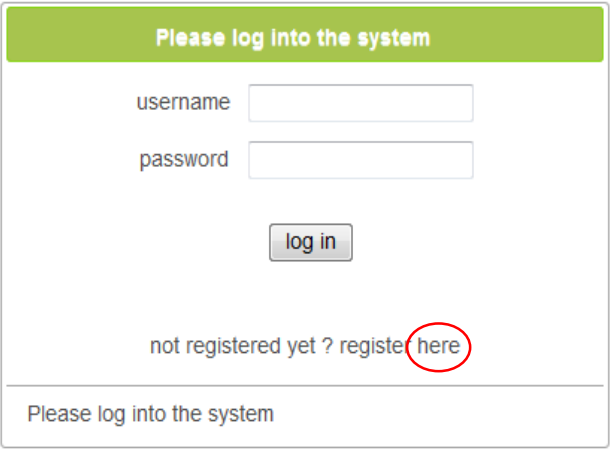


Figure 2. Log in screen.

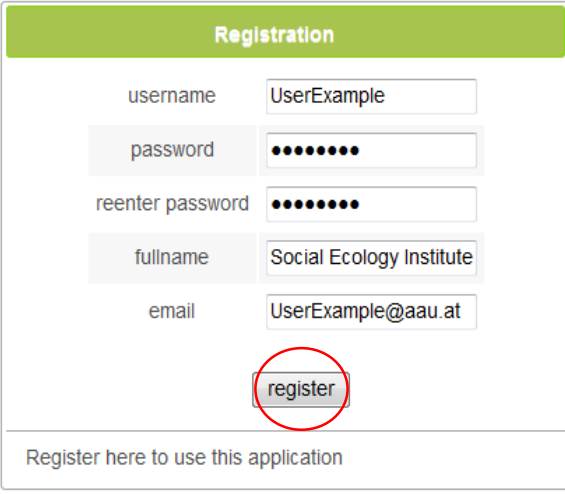


Figure 3. Registration screen.

Once the data is provided and sent (by clicking on the *register* button), registration is completed and the access screen prompts again. Enter the username and password chosen during the registration process, and click on the *log in* button (Figure 4) in order for the *home* screen of the software to show (Figure 5).




Figure 4. Logging into the software.

OPTamos software tool

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Figure 5. Home screen of OPTamos.

3. Step 2: How to start a new analysis

Once you have accessed OPTamos, the home screen displays all the analyses (henceforth, *projects*) saved by the user. Please note that the first time you access OPTamos, the list is still empty. To start a new process, you must click on the *new project* button (Figure 6).

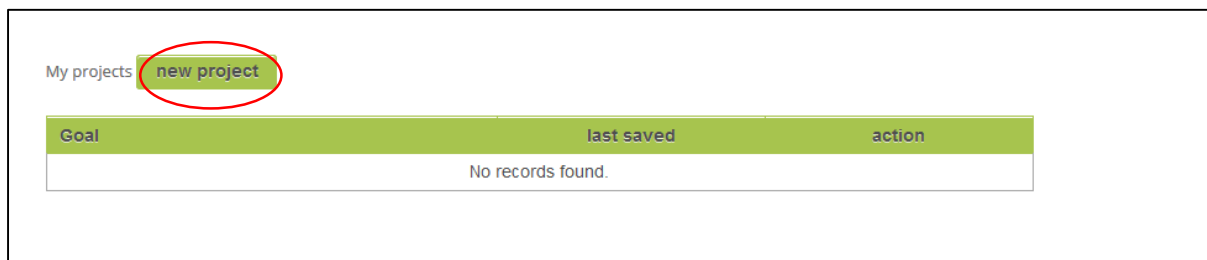


Figure 6. Starting a new analysis from the *home* screen.


The initial screen of the process displays the basic information needed (Figure 7). This information includes the *Goal* of the analysis (which, once introduced, becomes the identification name of the analysis among the different projects in the saved projects list shown in Figure 6), the decision guiding *Criteria*, the optional pathways available identified as *Options*, and the *Inconsistency Ratio* (a mathematical value indicating how logically the information is provided)¹.

¹ The developer of the Analytical Hierarchy Process (AHP) method (on which OPTamos is based), established that an acceptable value for inconsistency is ≤ 0.1 . For more information, see Saaty (1980).

Goal

save next

Criteria



add new

Options

no options defined yet

add new

Inconsistency Ratio

Inconsistency Ratio: 0,0000

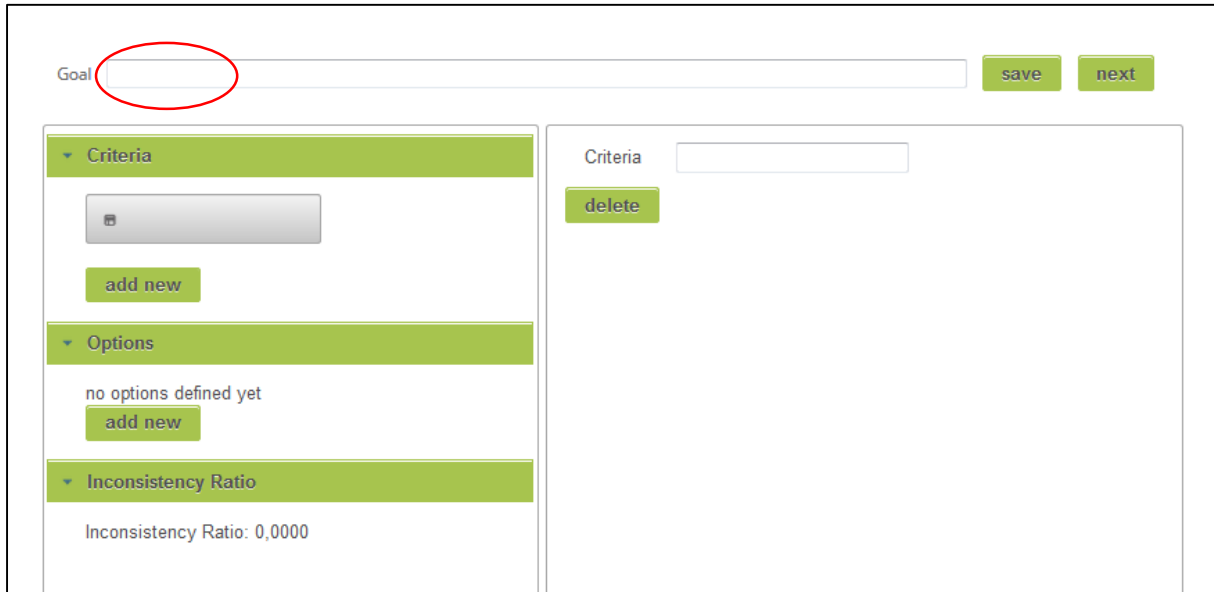
Criteria

delete

Figure 7. Initial screen of the process displaying the basic information needed.

4. Step 3: How to feed information into the system

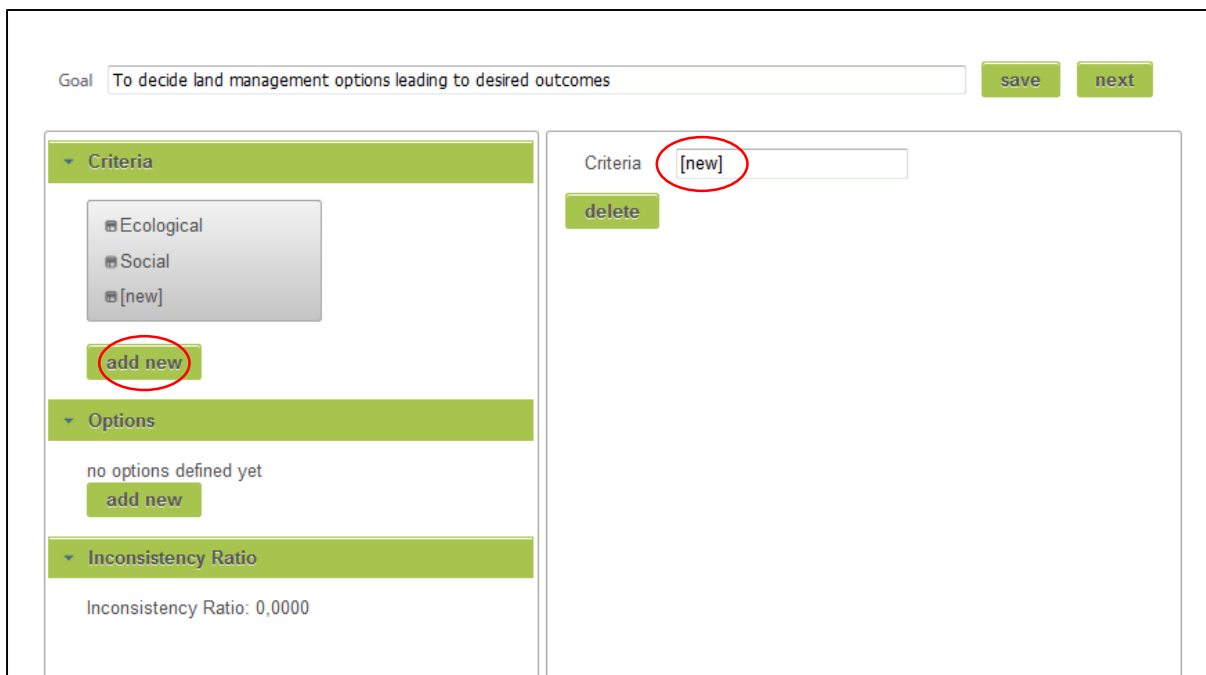
The initial information required to begin the process comprises the *Goal*, *Criteria*, and *Options*. To introduce the *Goal*, the cursor must be placed in the *Goal* field (Figure 8). Once the *Goal* is entered here, the software will automatically save it.



The screenshot displays the OPTamos software interface. At the top, there is a 'Goal' input field, which is highlighted with a red circle. To the right of the 'Goal' field are two green buttons: 'save' and 'next'. Below the 'Goal' field, there are three main sections: 'Criteria', 'Options', and 'Inconsistency Ratio'. The 'Criteria' section has a green header, a text input field, and a green 'delete' button. The 'Options' section has a green header, a text input field, and a green 'add new' button. The 'Inconsistency Ratio' section has a green header and displays the text 'Inconsistency Ratio: 0,0000'.

Figure 8. Introducing the *Goal* of the analysis.

To introduce the *Criteria*, the cursor must be placed in the *Criteria* field (Figure 9). After typing in the first criterion, the *add new* button of the *Criteria* section (Figure 9) must be pressed in order to save it and to generate a space for the following criterion. After typing in the last criterion, the list of criteria can be closed by pressing the *Enter* key on the keyboard. The process will then be automatically saved. At any moment, a particular criterion can be deleted by displaying it on the *Criteria* field and pressing the *delete* button below.



Goal

Criteria

☐ Ecological
☐ Social
☐ [new]

Options

no options defined yet

Inconsistency Ratio

Inconsistency Ratio: 0,0000

Criteria

Figure 9. Introducing the decision guiding *Criteria*.

To introduce the possible options that will be considered for the analysis, the *add new* button of the *Options* section (Figure 10) must be pressed to enable data insertion. After typing in the name of the first option, first press the *Enter* key on the keyboard to save, and then the *add new* button to introduce the second option. At any moment, a particular *Option* can be deleted by pressing the corresponding *del* button next to it.

Goal: To decide land management options leading to desired outcomes [save] [next]

Criteria

- Ecological
- Social
- Cultural
- Economic
- Political

[add new]

Options

Option	Prio	
To establish a natural reserve	33%	[^] [del]
To create an agroforestry system	33%	[^] [del]
[new]	33%	[^] [del]

[add new]

Inconsistency Ratio

Inconsistency Ratio: 0,0000

Criteria: Ecological

[delete]

To establish a natural reserve Set ratio to %0 To create an agroforestry system

To establish a natural reserve Set ratio to %0 [new]

To create an agroforestry system Set ratio to %0 [new]

Figure 10. Introducing the possible *Options* for the analysis.

5. Step 4: How to conduct pairwise comparisons (providing weights for Options)

Once you have entered the information on *Goal*, *Criteria*, and *Options*, the relative importance of each of these components is assessed by providing weights to pairwise comparisons. On the initial screen where the basic information is introduced, the *Options* are compared against each other (the level of importance of one option over another) with regards to each criterion. For example:

<div>Criteria <input type="text" value="Social"/></div> <div>delete</div> <div> <div> To establish a natural reserve <div>Set ratio to %3</div> <div></div> </div> <div> To create an agroforestry system </div> </div> <div> <div> To establish a natural reserve <div>Set ratio to %0</div> <div></div> </div> <div> To grow agricultural cash-crops at industrial scale </div> </div> <div> <div> To create an agroforestry system <div>Set ratio to %4</div> <div></div> </div> <div> To grow agricultural cash-crops at industrial scale </div> </div>	<p>Meaning:</p> <p>(Note: the following values are not based on any real case but used for the purpose of showing the three different possibilities of interpretation)</p> <ol style="list-style-type: none"> Regarding social aspects, <i>to create an agroforestry system</i> is 3 times more important (on a scale from 0 to 9) than <i>to establish a natural reserve</i> <i>To establish a natural reserve</i> is equally important to <i>grow agricultural cash-crops at industrial scale</i> <i>To create an agroforestry system</i> is 4 times more important (0 to 9 scale) than <i>to grow agricultural cash-crops at industrial scale</i>
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Figure 11. Example of pairwise comparisons of *Options*, and their interpretation.

In order to complete this step, all options are compared in pairs with regard to the first criterion. Once all weights are introduced in this pairwise comparison regarding the first criterion, the next criterion is selected (by clicking on it in the Criteria section to the left) to proceed with the pairwise comparison of *Options* with regards to the second criterion (Figure 12). This operation is repeated until all *Options* have been compared pairwise with regard to each *Criterion*. Once this comparison is completed, please check whether the *Inconsistency Ratio* remains no higher than 0.1 before moving on to the next criterion.

When all pairwise comparisons for the *Options* are completed, the user can move to the following step of the process by clicking on the *next* button located on the upper right-hand corner of the tool page (Figure 12).

Goal: To decide land management options leading to desired outcomes [save] [next]

Criteria

- Ecological
- Social
- Cultural**
- Economic
- Political

[add new]

Options

Option	Prio	
To establish a natural reserve	33%	^ del
To create an agroforestry system	33%	^ del
To grow agricultural cash-crops at industrial scale	33%	^ del

[add new]

Inconsistency Ratio

Inconsistency Ratio: 0,0000

Criteria: Cultural

[delete]

To establish a natural reserve Set ratio to %0 To create an agroforestry system

To establish a natural reserve Set ratio to %0 To grow agricultural cash-crops at industrial scale

To create an agroforestry system Set ratio to %0 To grow agricultural cash-crops at industrial scale

Figure 12. Selecting the *Criteria* to conduct the pairwise comparisons for the *Options*.

6. Step 5: How to conduct pairwise comparisons (providing weights for Criteria)

Clicking on the previously mentioned *next* button moves the process to the following page, which displays the pairwise comparisons of the *Criteria* (Figure 13). On this page, all possible combinations to compare each criterion against the others are presented (level of importance of one criterion over another) with regards to the *Goal*, providing weights in the same scale and manner as they are provided in the pairwise comparisons of the *Options*.

Goal To decide land management options leading to desired outcomes back save finish

Ecological	Set ratio to %0	Social
Ecological	Set ratio to %0	Cultural
Social	Set ratio to %0	Cultural
Ecological	Set ratio to %0	Economic
Social	Set ratio to %0	Economic
Cultural	Set ratio to %0	Economic
Ecological	Set ratio to %0	Political
Social	Set ratio to %0	Political
Cultural	Set ratio to %0	Political
Economic	Set ratio to %0	Political

Figure 13. Providing weights for the pairwise comparisons of the *Criteria*.

Once the values are given for each comparison, the user can move to the results page by clicking on the *finish* button on the upper right-hand corner of the page (Figure 13).

7. Step 6: How to visualize results

On the results page (Figure 14), the final results of the analysis are presented graphically with histograms and numerically in a matrix. All values displayed are relative percentages, except for the values of the *Inconsistency Ratio*, which are dimensionless numbers. On the histograms, moving the pointer of the mouse over each bar displays its exact numerical value calculated.

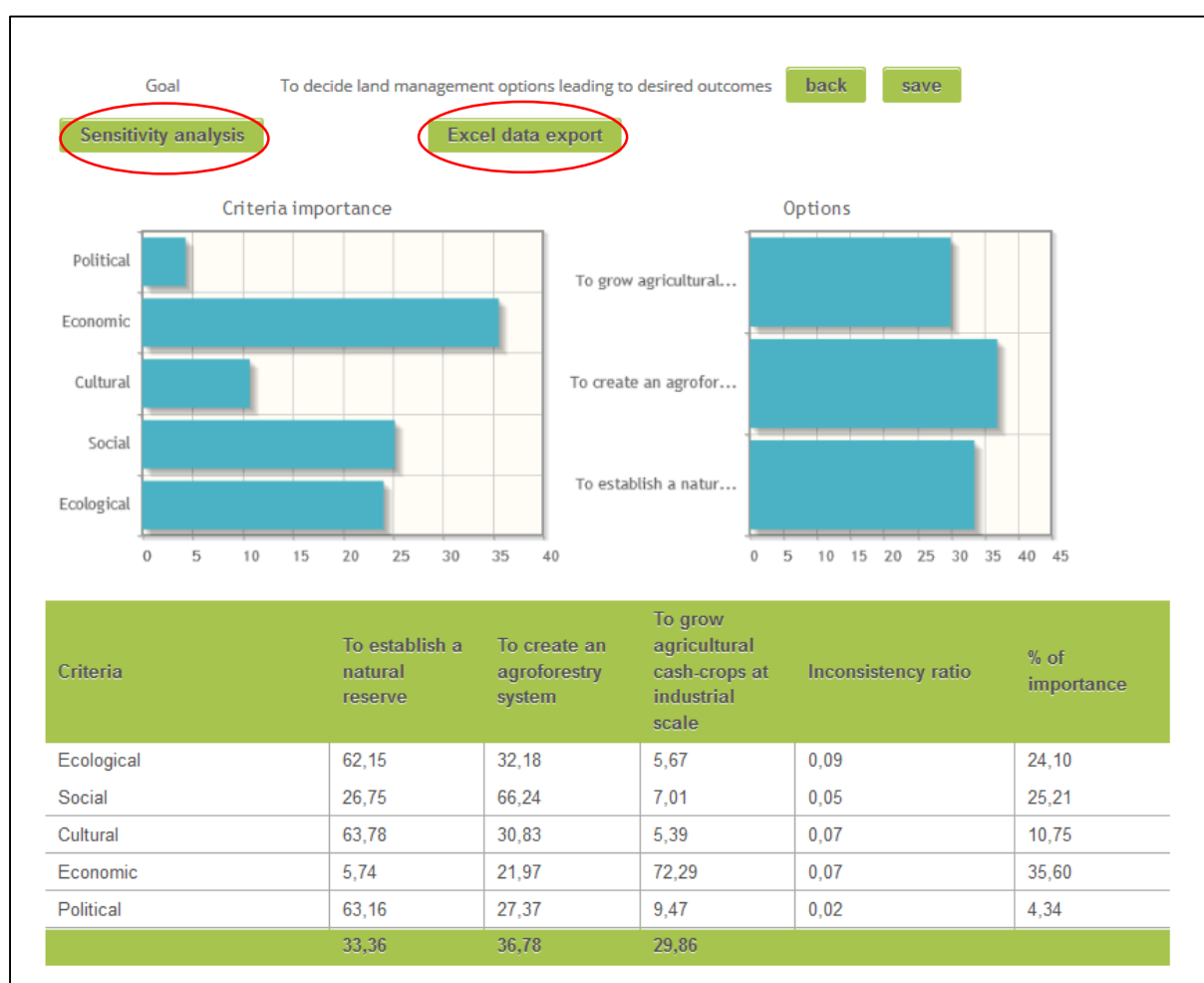


Figure 14. Results page.

By clicking on the *Excel data export* button, a Microsoft Excel file is created with the information displayed on the matrix of results. This file can be saved in a storage device (i.e. USB flash disk) or can be printed.

An additional and optional step can be taken by pressing the *Sensitivity analysis* button on the upper left-hand corner of the screen (Figure 14).

8. Step 7 (optional): How to perform a sensitivity analysis

By pressing on the above-mentioned *Sensitivity analysis* button, a page is displayed where this analysis can be performed (Figure 15). A sensitivity analysis studies how a particular value (or characteristic) of the results can be the consequence of a particular value (or characteristic) of the information introduced by the user (how changes in the pairwise comparisons affect the final results). For more information on sensitivity analysis, see Panell (1997) and Saltelli et al. (2008).



Figure 15. Sensitivity analysis page.

9. References

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