The Application of Multi Criteria Analysis in Sustainable Forest Management Decisions – a research study for Participative Decision Support

Effective and sustainable forest management relies on safeguarding economic, social, and ecological services of the forest to its users. In general, the broader public values forests especially by its ability to provide social and ecological services. Currently, we lack tools to incorporate interested stakeholders effectively into forest management related decision processes as well as tools to communicate such decisions transparently to the broader public.

The absence of such tools is one of the reasons why conflicts on forest use occur between different groups of stakeholders. The goal of this project is to investigate the applicability and usefulness of two Multi Criteria Analysis (MCA) methods in assisting decisions processes for large forest units, namely the Analytic Hierarchy Process (AHP) and the Value Benefit Analysis (NWA). We seek to analyze strengths and weaknesses of both methods and draw implications if one or both of these tools can be used in the future to support an open dialogue between forest professionals and interested stakeholders.

This research project applies both methods to large forest units. The forest unit Ruhestein was divided into a 50mx50m grid representing the research units. For each of these research units, we carry out a decision process with both of the methods AHP and NWA. This approach results in so called suitability values of the different treatment alternatives for each research unit. By determining criteria weights in a participatory process, involvement of stakeholders is ensured. This weighting process performed by stakeholders is the foundation of the subsequent calculations of the suitability values for each treatment alternative. This decision process relies on determining relevant decision alternatives and relevant criteria for a sustainable forest management, the determining of the suitability of the alternatives on the criteria and the weighting of the relevant criteria by the different stakeholder groups. In the research units of the Ruhestein we applied the two Multi Criteria Analysis Methods in five steps. For the research process we could find six forest experts of different areas of forest science. Additionally we found seven people of three different stakeholders groups:

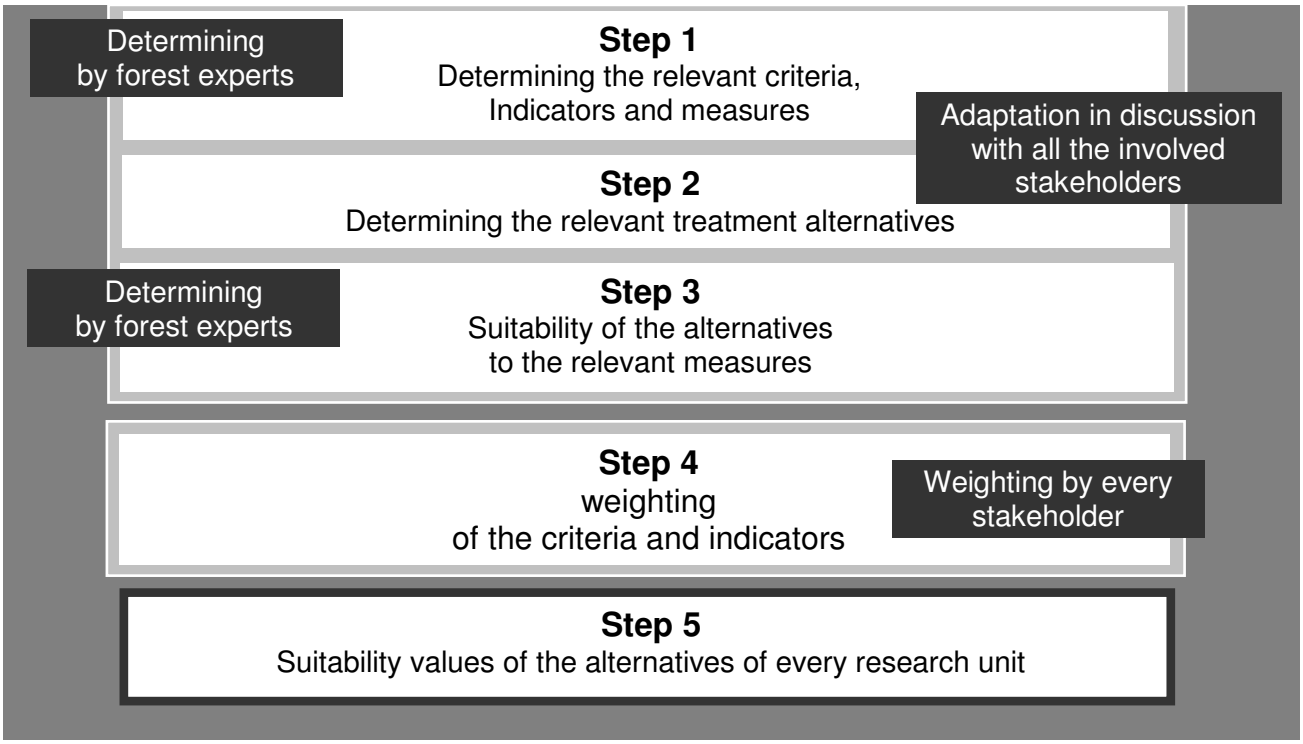


Table 1 shows the different steps of the AHP and NWA at the research study Ruhestein.

The determined criteria, indicators and measures for a sustainable forest management in the Ruhestein research study are as follows:

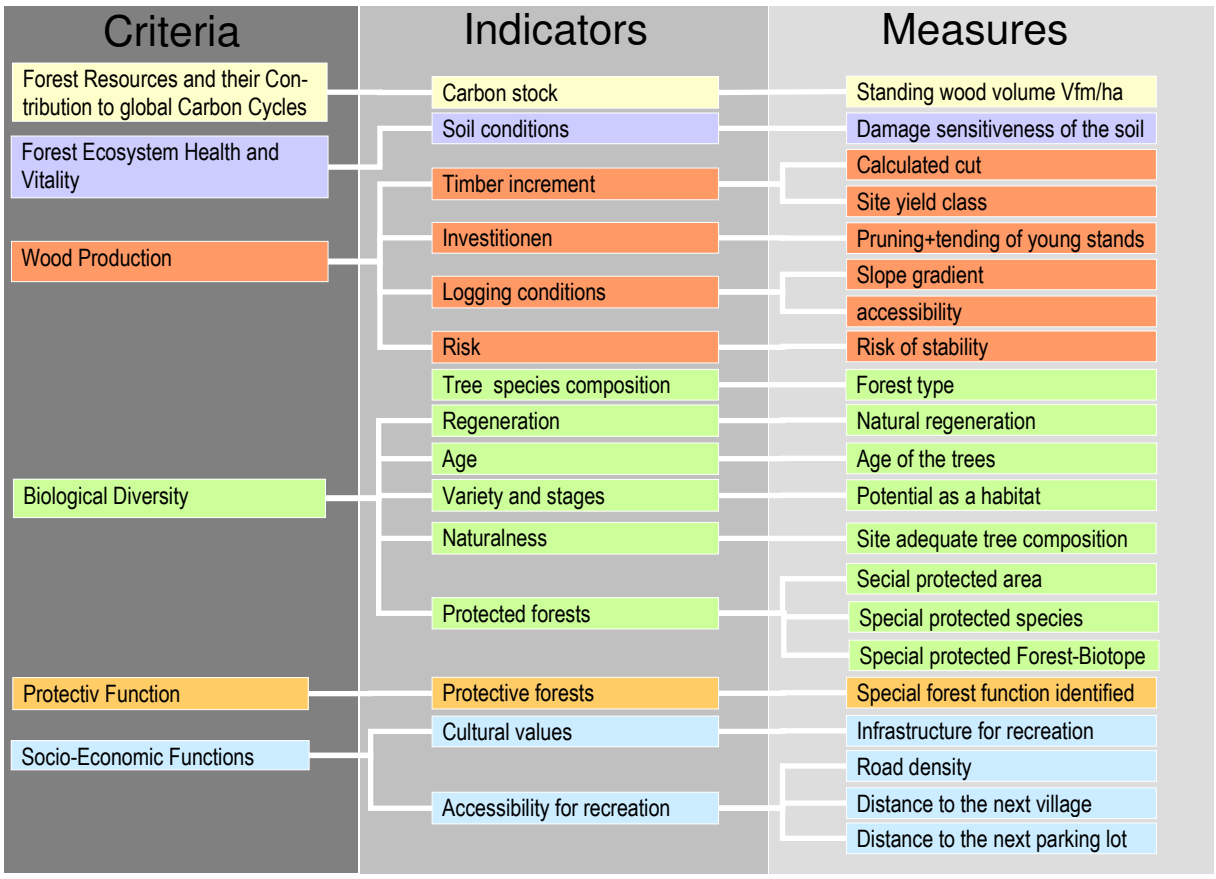


Table 2

To determine the suitability of the different alternatives to the relevant indicators, we need to determine the conditions of every the research unit. For this we have to determine the readings in different levels, appropriate to the different reading in f.e. low, normal, high or yes, no or young, middle old, old, etc.

Example:

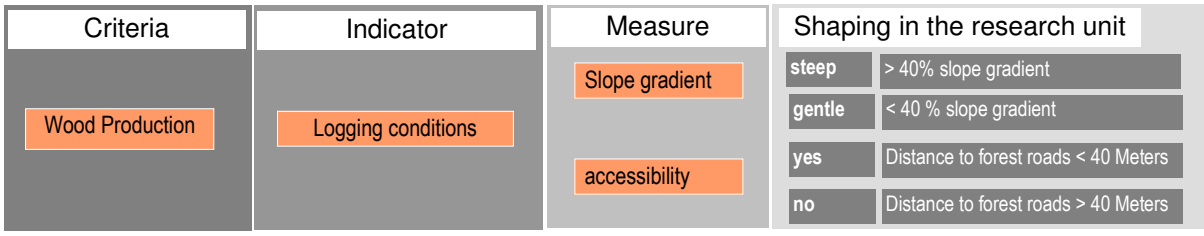
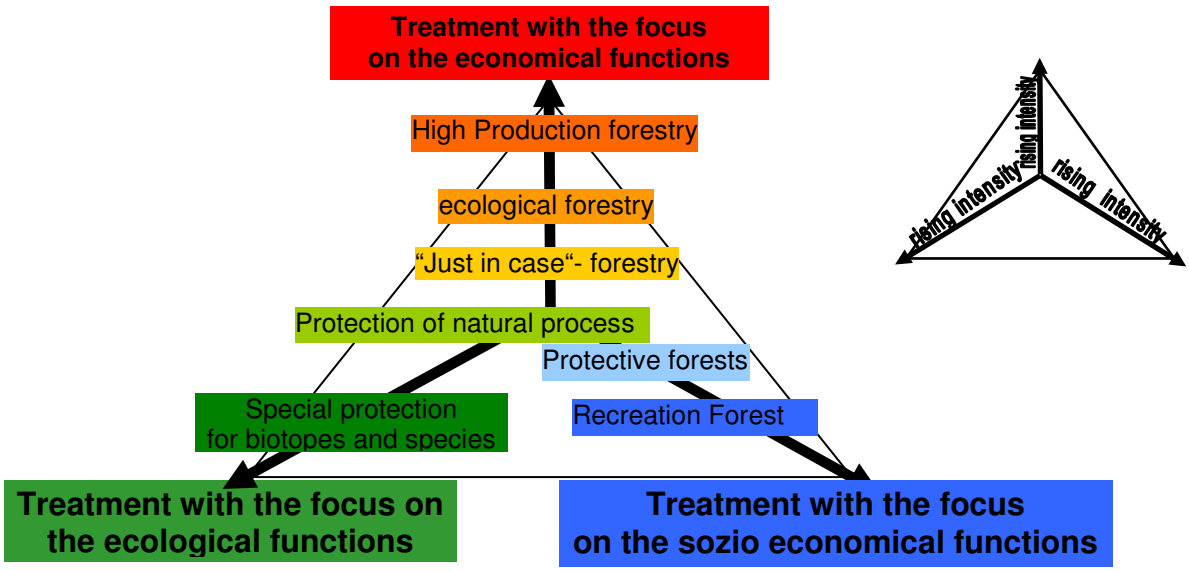


Table 3

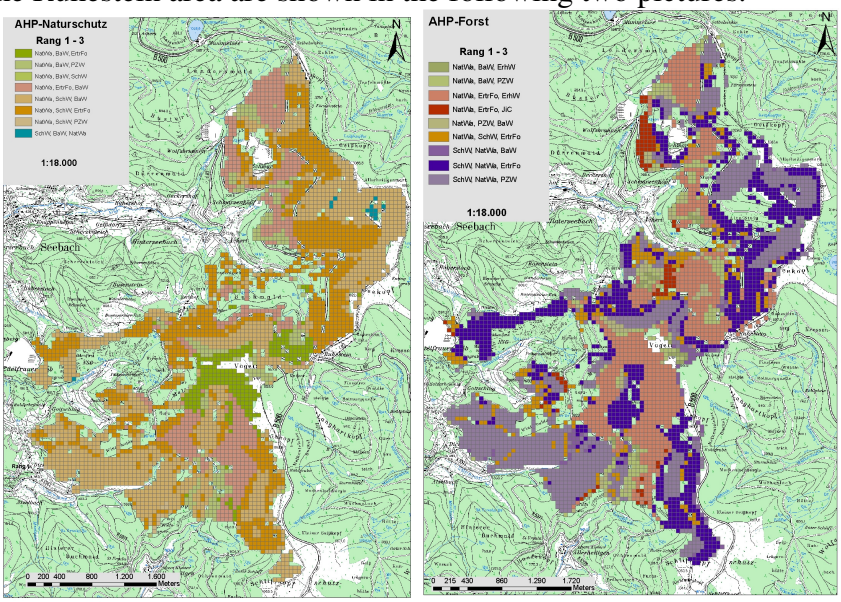
After this step the forest expert have determined the suitability of the following alternatives of forest treatment to every level of the readings. The determined alternatives for the treating of the forest are shown in the following table:



Picture 1

In the next step the stakeholders were asked to determine the weight of the criteria and indicators for the decision for a sustainable management from their point of view. With this weighting of the stakeholders and the determination of the suitability of the alternatives for the different levels of the readings we can determine the final suitability values for the research units. From the final suitability values we can see the priority of the alternatives and show different scenarios from the different stakeholder groups.

The determination of the criteria, indicators and readings levels, the definition of the alternatives are naturally the same for the AHP and the NWA. The two methods are different in the process to do the determination of the suitability of the alternatives and the weighting of the criteria and indicators. The focus in our research project is to identify the opinion of the stakeholder belonging to the two methods. The aim is to identify the strength and weakness of the two methods as instruments for a participative decision support for a sustainable forest management. To get this information we do interviews with every involved stakeholder and every forest expert. From the actual point of view we can say, the two methods can both be useful instruments, the advantage of the NWA is the faster way to do the determination of weighting and suitability. The advantage of the AHP is the more explicitness of the differences between the alternatives and the weighting. Examples for the suitability values for each research unit in the Ruhestein area are shown in the following two pictures.



Picture 2