# The Science of Decisionmaking:

## Applications for Sustainable Forest and Grassland Management in the National Forest System

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# Appendix A: Guidance for Tough Choices

## What Are the Practical Ways To Deal With Complex Decisions?

Below are some practical approaches and tactics (not necessarily mutually exclusive) that could help if you find yourself stuck at a crossroads when facing a tough decision.

### 1. How Did I Get Here?

First, you might ask—"how did I get here?" It may help to go back through the previous stages of the structured decisionmaking (SDM) process, recounted below, and ensure that the work performed up to the decision point stage is sufficiently clear and comprehensive and provides enough information to make a fully informed decision.

#### Problem Structuring Stage

*Objectives and evaluation criteria*

- Be sure that all key terms in your objectives and decision criteria are fully defined.
  - In simple English—articulating terms brings far greater clarity and may suggest further, guiding ideas, as words often have multiple meanings and connotations (linguistic uncertainty).
  - If appropriate, with threshold or acceptable values and clear units of measure (evaluation metrics).
- Simplify, combine, or exclude some of your objectives and decision criteria.
  - If some are redundant or highly correlated with others.
  - If some are illogical or clearly contradictory with others.

#### Problem Analysis Stage

*Creating alternatives and evaluating their consequences*

- Break the problem down into smaller, simpler problems that already have solutions or methods for solutions.
  - Separate out sequences of decisions and their effects into individual units.
  - Separate out type of effects or geographic areas affected.
- Simplify the range of potential alternatives.
  - Exclude outright alternatives that are infeasible or illegal.
  - Combine the remaining alternatives into a smaller set that are feasible and practicable, and that all meet the overall, initial decision objectives.
  - Identify those alternatives that are truly infeasible, illegal, or intractable, and the elements of decisions that would lead to them, in which case these elements may be ones to avoid in the final solution; call this the "painting the negative space first" approach.
- Work backwards from desired outcomes.
  - Clearly state your decision criteria.
  - For each outcome, write down several possible means by which it could be met.
  - Combine all these means into a single table with columns for decision criteria and rows for possible means; compare the performance of each alternative to this table and identify those alternatives that best meet the most decision criteria; and consider amending some alternatives if new solutions can be identified.

*Tradeoff analysis—or, characterizing and distinguishing alternatives*

- Title each decision alternative with a catchy name that best characterizes its main attributes.
  - Use this catchy name to help identify how alternatives differ in key ways, rather than how they are similar.
  - Restate each alternative and its potential consequences as a story, avoiding the use of math, probabilities, and numbers.
- Group the alternatives into a few, well-named categories.
  - Ensure that the first choice, if it exists, is among the general categories.
  - The next choice is among the (fewer) alternatives within that category(s).

### 2. Use Methods to Balance Alternative and Objectives

Second, you might turn to decision-support approaches that directly relate to the decision point stage itself and that provide guidance for balancing alternatives and objectives.

#### Decision Point Stage

*Comparing performance of alternatives and examining sensitivities*

- Consider your objectives and decision criteria one at a time.
  - Add them on incrementally and list which alternatives still meet the set.
  - Help narrow down the set of alternatives for fuller analysis by using this evaluation.
- Consider the effects of each of your decision criteria.
  - Think about how alternatives might rank differently if you were to drop each of the decision criteria individually (sensitivity testing of the criteria).
  - Consider alternative ways the most influential decision criteria could be met, perhaps outside the specific set of decision alternatives presented.

*Think "outside the box"—beyond the specific decision context*

- Consider the outcome of some similar problem already solved.
  - Use metaphor and analogy to reconsider the problem at hand. (This evaluation is a good heuristic to help discover a solution.)
  - Look at the uncertainties—think of a problem that has similar unknowns.
    - Focus on those key unknowns that are most uncertain and that might most influence the outcome (your decision) if known.
  - Consult with fellow decisionmakers on similar problems they may have addressed.
  - Find another situation in which the objectives have successfully been met, even if the problem statement per se was different, and see how they got there.
  - If you cannot find another similar problem, find one that has similar key unknowns and look at how the unknowns were handled in that solution.
  - Based on any of the above actions, find out if the problem, objectives, and perhaps even the decision criteria can be restated for greater tractability, clarity, and feasibility.
  - Exploit your success! (Polya 1973)
    - Determine if you can apply a successful approach, and solution, to another problem.

*Turning to more formalized approaches (e.g., multicriteria decision analysis)*

- Use an objective hierarchy approach.
  - Prioritize those objectives you initially laid out.
  - Rank each alternative according to how well the alternatives meet each objective.
    - Note that "How well" can be denoted by a probability or on a 1-to-10 scale.
  - Sum all the rankings, weighting them by the priority level of the objectives.
    - May establish priorities with ordinal scale (e.g., 1st, 2nd), or
    - May establish priorities with subjective weights.
  - Filter out the alternatives that fall below an acceptable threshold.
    - Or simply order the alternatives according to their rankings.
    - And then consider the top-ranked alternatives as best possible choices.
  - And consider that perhaps one decision criterion may pertain to the degree of reversibility of a decision.

#### Still Can't Make a Decision?

Ask yourself if not making a decision is more detrimental to the suite of objectives than is making a decision under uncertainty. Do not forget the key role of monitoring and adaptive management, although these actions do not substitute for a poorly made or ill-informed decision.