**OBJECTIVES**

By the end of this module, you should be able to:

* Understand that the quality of a decision is only as good as the set of alternatives
* Recognize different types of alternatives
* Build a strategy table
* Understand the need and approaches for creative development of alternatives

**IMPEDIMENTS**

* A decision is only as good as the set of alternatives available to choose from
* Poor sets of alternatives arise from
* Anchoring. Often, the development of alternatives starts with the status quo and only makes minor adjustments to that. Such anchoring fails to consider a broader range of alternatives
* Focusing on irrelevant actions. In some processes, a lot of time is spent fussing over actions that do not affect the objectives of interest
* Difficulty seeing the full set of complex alternatives. In some decision problems, the theoretical number of alternatives is very large, perhaps infinite, but only a small number will be entertained
* Mistaking action elements for alternatives. In some decisions, the alternatives are composed of many different elements. The choice is not among the elements, but among the alternatives they compose.

**DESIRED PROPERTIES OF ALTERNATIVES**

***In general, alternatives…***

* Are generated after the fundamental objectives are articulated, so you know what you are trying to achieve
* Where to go for lunch? It depends upon what you want from your dining experience
* How to manage a forest? Forest management approaches depend on desired future condition
* Describe possible courses of action
* How can you influence your objectives, or get what you want?
* Define the set of options from which the decision maker will choose
* You cannot select an alternative that has not been identified for consideration
* Be creative, imaginative, and open‐minded
* Focus on the future – don’t get bogged down in the past
* Are not evaluated until the Consequences step of PrOACT
* Avoid stifling creativity through brainstorming that could lead to a break‐through idea
* Possible exception: “screening” a prohibitively large set of alternatives (see below, Desired properties of a set of alternatives)

***Desired properties of individual alternatives***

May apply these less strictly on first prototype because the Problem and Objectives may change

* Value‐focused
* Designed to influence the fundamental objectives
* Within the scope of the problem
* Able to be implemented by the decision maker
* Look for hidden (i.e., previously unspecified) objectives
* Ask why each alternative might be good, and the answer should relate to an objective
* Complete and comparable
* Address all key aspects of the problem and apply to a consistent framing of the problem
* Fully specified
* Sufficient detail for predicting consequences later
* Internally coherent
* Alternatives with multiple actions, or elements, make logical sense
* Distinct
* Different enough from other alternatives to be considered a real choice, not just a minor tweak

***Desired properties of a set of alternatives***

* The set is large enough…
* That all fundamental objectives are addressed by at least one alternative
* To provide a wide range of different alternatives for consideration
* The set is small enough…
* To be analyzed for consequences and trade‐offs with a reasonable investment of time and effort
* To be presented for careful group deliberation

Try to generate a large list of alternatives first. Avoid evaluating them in any way. If the list is prohibitively large for formal evaluation during the next step (predicting consequences), however, you may consider screening them or applying constraints (see Module 10: Portfolio problems).

**TYPES OF ALTERNATIVES**

We distinguish among three types of alternatives that differ in how they are created and analyzed

* Simple alternatives
* Discrete
* Which parcel of land should I acquire to expand my refuge?
* Should I spend this last $500 on field supplies, office supplies, or travel?
* Continuous
* Alternatives are different points along a scale
* What should be the target harvest rate for this population?
* Portfolios
* Each alternative is a collection of similar actions, or elements
* Which set of research projects to fund this year?
* How much money to allocate to five different departmental budgets?
* Value is derived from both
* the individual elements
* Often the elements are scored first based on their individual characteristics
* the portfolio as a whole
* Objectives should relate to the characteristics of the portfolio
* e.g., total cost, number of regions represented, length of private‐land boundary
* The number of alternative portfolios may be very large
* Select *k* elements from *n* possible elements: possible combinations
* We have 30 proposals and can fund 5 of them
* 142,506 different sets of 5
* See Module 10 for a complete treatment of this type of problem
* Examples?
* Strategies
* Each alternative is a collection of dissimilar actions, or elements
* How should we manage damage to riparian areas caused by hemlock woolly adelgid?
* Actions related to treatment of adelgid, forest management, buffer retention

**STRATEGY TABLES**

***Why?***

* Decisions in natural resources management are complex
* We are not limited to implementing a single action, even for relatively small problems
* Strategy tables help us structure a potentially large and bewildering list of possible actions into a manageable set of alternative strategies that make sense and address our needs

***Building a strategy table***

* Generate a list of possible actions to address the fundamental objectives
* Identify general categories into which the actions fit logically
* Categories may relate to the objectives, responsibilities of staff, times of year, etc.
* Place each action in its category

Beaver Management – organize the actions into categories:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

* Build the table:
* The first column identifies each alternative strategy
* Additional columns for each category of actions
* Each row in the table defines the set of actions comprising an alternative strategy
* Define the strategies
* Use themes – these may be inspired by different stakeholders, levels of management intensity, etc.
* Bookends – include most and least extreme
* Status quo – often at least one stakeholder is resistant to change and will need to see direct comparisons
* Consider using “no action”
* Can a strategy include:
* No action from a category
* Yes, but it is useful to note this as “no action”
* >1 action from a category?
* Depends upon the decision context – are actions within categories mutually exclusive?

Beaver Management – Strategy Table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Alternative strategy** | **Dams** | **Beavers** | **Water** | **Resources** |
| Cease action | Do nothing | Do nothing | Do nothing | Do nothing |
| Status quo | Remove w/ heavy equip | Do nothing | Do nothing | Repair |
| Water focused | Remove w/ heavy equip | Do nothing | Add control structure | Repair & dike |
| Beaver focused | Remove w/ heavy equip | Trap | Do nothing | Repair |
| Most intensive | Remove w/ rakes | Shoot | Add control structure | Repair & off-site mitigation |

**THE IMPORTANCE OF CREATIVE THINKING IN DEVELOPING A GOOD SET OF ALTERNATIVES**

***Cognitive biases and harmful group dynamics***

See original descriptions in Module 1 (Human Decision Making). Here are ones with relevance to generating alternatives…

* Anchoring
* On the status quo
* On the first alternatives that are suggested
* On a small subset of the fundamental objectives
* Availability bias (familiarity)
* Focus on recent problems and solutions
* Focus on major successes or failures in the past
* Group think
* Accepting constraints as fixed when they might be removed
* Tendency to end the search for alternatives when a preferred “best” alternative is offered

***Approaches for encouraging creative thinking***

* Focus on fundamental objectives – what are you trying to achieve?
* First one‐at‐a‐time, then in pairs, etc.
* Brainstorm individually before discussing
* Do not assess feasibility or efficacy when generating alternatives; that comes later
* Visualize the system
* Look at the objectives hierarchy
* How can you influence the mechanisms that affect the fundamental objectives?
* See Influence Diagrams in Consequences module
* Consider alternatives that are contrary to past practice
* Consider the problem from the perspectives of others
* Ask for ideas for alternatives from a broad set of people
* Consider diverse scenarios about the future
* Challenge perceived constraints
* What if money were not limited?
* What if a difficult constituency were not involved?
* Remember that the search for good alternatives is not over until a decision is implemented
* Consider defining new alternatives after the first prototype of predicting consequences and analyzing trade‐offs

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**MODULE DEVELOPED BY:**

Michael A. Larson, *Minnesota Department of Natural Resources*

Angela Matz, *USFWS Fairbanks Field Office*

Mitch Eaton, *DOI Southeast Climate Science Center*

Jean Fitts Cochrane, *USFWS Retired*

Jennifer A. Szymanski, *USFWS Midwest Region*

James E. Lyons, *USFWS Patuxent Research Refuge*

Sarah J. Converse, *USGS Washington Cooperative Fish and Wildlife Research Unit, University of Washington*

Michael C. Runge, *USGS Patuxent Wildlife Research Center*

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