

## Evaluating and Selecting Water Use Options: A graphical method using the water use options criteria

Objectives:

- Introduce kite diagram
- Short explanation of how we go from criteria to kite diagram
- Pros/cons of this graphical approach

Once we have identified water use options, we can use the criteria to produce a kite diagram, which looks like this:

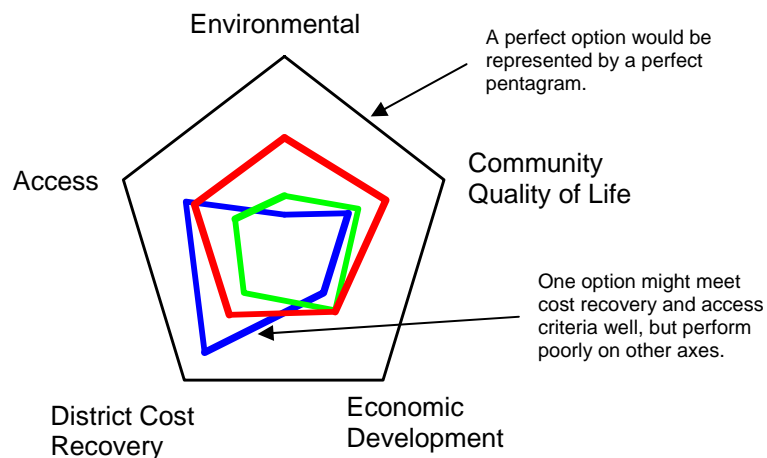


Figure 1. An example kite diagram representing how well 3 water use options (red, blue, and green options) meet the criteria within the groups we identified (environmental, community quality of life, economic development, District cost recovery, and access).

How to read a kite diagram: A perfect option would completely meet all criteria; it would be represented by the black pentagon. Less perfect (more realistic) options would be represented by pentagons inscribed inside. The colored pentagons tell us which criteria groups were not met very well; alternatively, they tell us which aspects of a water use option we could change, to approach a better, “perfect,” option.

In the example kite diagram above, the blue option meets District cost recovery criteria well, but does not meet environmental criteria as well. We could then revise the blue option so that it meets environmental criteria better.

### How we go from criteria to kite diagram

Overview: Sheri describes the criteria scoring sheets. Each AC member scores the options based on the criteria either together in meeting(s) or at home. Sheri and Pete Nelson (HT Harvey) crunch the data in the Raptools spreadsheet and provide kite diagram(s).

Scoring sheet for Water Use Option X (fill out a sheet for each option).

<b>Criteria:</b>	Fully meets	Somewhat meets	Doesn't meet
<b>ENVIRONMENTAL</b>			
maintain in-stream flows			
protect and maintain wildlife & fisheries			
enhance/inc habitat area/quality			
use least energy in water delivery			
<b>ACCESS</b>			
maintain use of as much flow as possible			
provide high qual water, meet/exceed standards			
provide sufficient water supply			
allows river/lake recreation			
protect/maintain access for Native Americans			
<b>ECONOMIC DEVELOPMENT</b>			
contribute to vital regional economy			
encourage tech innovation/entrepreneurship			
create or retain jobs in region			
<b>DISTRICT COST RECOVERY</b>			
contribute to covering District costs			
increase customer base			
decrease customer rates			
uses existing industrial infrastructure			
generates energy for use or sale			
<b>COMMUNITY QUALITY OF LIFE</b>			
supports and improve community health			
encourages community engagement			
inspires wide-spread community support			

What happens in the Raptools model: The “fully meets,” “somewhat meets,” and “doesn’t meet” choices are actually numbers (2, 1, 0). The model uses a statistical approach called multi-dimensional scaling, “which is a nonparametric method that focuses the statistical analysis on the rankings of items (in this case, the scores), not on the numerical value of the score itself” (HT Harvey 2009). Statistics are performed on the rankings (the order) of the attributes, not on the numerical scores

### Pros and Cons of this Graphical Approach

Advantages	Disadvantages
Allows us to compare options using numerous (20!) criteria	“Black box” model; the statistical arithmetic is hard to understand and explain
Allows us to have varying and individual opinions and scorings; uncertainty can be recognized and addressed	It is just a tool and not “the answer”; graphics can convey more certainty and validity than warranted
“Vetted” method used in fisheries resource management	Does not weight criteria (this could be an advantage!)
Kite diagrams easily understood once the “key” is understood	
It is an accepted tool in a new application, which is in keeping with our Water Resources Planning process!	