Spatial MCDM: Evaluating alignments on transportation corridor studies is a complex process that involves different factors and criteria. Multi-Criteria Decision Making (MCDM) is a systematic methodology to compare, select, and rank multiple alternatives from conflicting values and opinions based on computational hierarchy approach that can be implemented in a GIS.

The Process: The thematic layers correspond to the decision factors and their process that involves different factors and criteria. Multi-Criteria attributes correspond to the criteria being considered. At first, factors are selected and then criteria per factor are ranked and select, and rank multiple alternatives single scenarios are computed.

The thematic layers correspond to the decision factors and their process that involves different factors and criteria. Multi-Criteria attributes correspond to the criteria being considered. At first, factors are selected and then criteria per factor are ranked and select, and rank multiple alternatives single scenarios are computed.

Factors: The thematic layers correspond to the decision factors and their process that involves different factors and criteria. Multi-Criteria attributes correspond to the criteria being considered. At first, factors are selected and then criteria per factor are ranked and select, and rank multiple alternatives single scenarios are computed.

Results: Increasing the complexity of the scenario

Conclusion: Streamlining early planning and environmental implications enables corridor alternatives to be generated in an efficient and systematic manner and multiple scenarios to be considered in the transportation planning process to facilitate major decisions prior to engineering approaches.

Acknowledgment: This project was made possible by funding and support from the U.S. DOT - Research and Innovative Technology Administration (RITA) - Cooperative Agreement DTOS59-07-H-0004. The views, opinions, and statements contained in this article are solely those of the authors and do not represent the official policy or position of the Department of Transportation or the Research and Innovative Technology Administration. The authors wish to thank the MDOT and the TDOT for partnering and contributing to the research project.

How does it work?

1) Selecting factors “positive/negative impact for environment cost, etc.”
2) Ranking criteria (single scenarios) “quantifying degree of influence – ex: distance from Wetlands”
3) Ranking factors (combined scenarios) “quantifying importance of factors – ex: Wetlands X Agriculture”
4) From ranking to weights “mathematical approach based on pair-wise comparisons”
5) Least-Cost Path “GIS approach with map algebra”

The output show close similarity to results of traditional transportation planners planning methods, but was generated using automated approaches. The side figure shows the proposed I-269 alignment in red and the least-cost alignment in green.