Interactive comment on "Determination of cost coefficients of priority-based water allocation linear programming model – a network flow approach" by F. N.-F. Chou and C.-W. Wu

Anonymous Referee #1

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Chou and Wu present a compelling description of how to set up a network flow programming approach. Modeling complex water resource systems is a challenge in and of itself, but if one includes multiple users with varying allocation priorities it can become a nearly impossible task. Overall, I think Chou and Wu make an important and practical contribution to the literature.

Their work does raise one important question as to what information can be gleaned from the calculated cost coefficients. Let us imagine a complex system with many users who have priority-based allocations of water (i.e., the prior-appropriation system of water rights that is commonly used in the western United States). What can the

magnitude of a cost coefficient for an individual water right say about the value of that water right relative to other water rights? More specifically, let us assume a municipality wishes to purchase a water right. The municipality enters negotiations with a number of current water right owners who may be interested in selling. The water rights of the current owners have varying allocation priorities, withdrawal locations, and asking prices. Might an NFP approach that calculates cost coefficients might also inform the municipality as to the relative value of each water right? Combined with the price of each water right, could the cost coefficients indicate to the municipality which water right is the best deal?

As to criticism/suggestion of the paper, I have only one significant suggestion. The equations in the paper are grounded in linear algebra and set theory, as they should be. But for those of us less practiced in them, these formulations can be hard to follow. The authors kindly included Appendix A, which explains Krofts enumeration algorithm. Other appendices that lay out the algorithms for the various water allocation rules (using their study region as an example, perhaps) might expand not only the readership of this paper, but also the application of its techniques. If the authors would be willing to add such appendices, I think the paper would greatly benefit from it.

All in all, a good paper. (Please note that I only marked the figures as "Good" as their resolution was pretty poor on my end, but I'm sure that's not the problem with the originals.)

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