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Hydrology and Earth System Sciences Discussions

Interactive comment on "Raising the dead without a Red Sea-Dead Sea canal? Hydro-economics and governance" *by* D. E. Rosenberg

Anonymous Referee #1

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I. General Comments

The analysis is of significance given that it complements current work on the same issue by the World Bank. The analysis could be substantially strengthened if it addresses how the modeling extensions incorporated into the baseline WAC alter the conclusions that the model produces about the costs and viability of different policy alternatives. For example, how does incorporating agricultural return flows into the model change the solution? An in-depth examination of how the model extension drives the conclusions would also be informative. As written, the analysis simply extends an existing model without demonstrating the benefits to doing so. It's scientific significance could be increased with attention toward making the results more generalizable.

The policy conclusions do not follow from the modeling exercise. It is unclear how the model leads the author to conclude that subsidy payments must be used to ensure adequate deliveries of water to the Dead Sea from each country (I agree - but how does the model analysis produce this result?). The policy conclusions center around a public goods issue while the modeling exercise derives a marginal cost curve for providing minimum flows to the Dead Sea under each proposed policy alternative. Further, the author refers to both subsidies and external investment in fixed infrastructure as potential means of ensuring the provision of minimum flows. The author should recognize that these policy instruments have markedly different economic implications for the countries involved and the distribution of benefits/costs among them.

II. Specific Comments

The results of the steady-state static model represent a long-run equilibrium, but say nothing about the transition to that state. This caveat should be noted.

The introduction of brine waste as a water type to fulfill the minimum flow requirement immediately raised concerns about the water quality aspects of the problem. This issue should be discussed prior to the "limitations" section.

The minimum flow constraint need only be satisfied on average, but deviations below the constraint may cause the system to cross environmental thresholds, as would be the case with sustained periods of very low flows. Often, minimum flow constraints must be satisfied at all times, rather than on average, to ensure environmental benefits from the policy.

Reformulating the model as a MINLP problem introduces substantial computational complexity. What did the author do to ensure that the optimum reached was a global rather than local solution? How does the GAMS DICOPT solver perform? Is it reliable? How dramatically different are the model solutions with the mixed-integer extension as opposed to the continuous version?

Groundwater levels are fixed in the model but likely endogenous in reality. What is the effect of this assumption?

Do the different policies result in different benefits? In particular, why was the desalinization plant included in the initial proposal? If it provides different benefits than the alternatives, perhaps it is ultimately more viable. The WTP estimates for the benefits are referenced in a cursory way in the text. More discussion of what the benefits to the different policies are would be informative.

Why does the price schedule in Column B of Table 2 decrease with an increase in the minimum flow requirement from 800 to 900 MCM? Why would it be constant after that point? There should be some explanation of this counter-intuitive result.

Should the first "dead" in the title be capitalized? I found the title to be prohibitively confusing, and only understood it after beginning to read the article.

III. Technical Comments

On p.9665, line 9 is missing a subject. On p.9667, line 13 should read “latter” not “later.” On p.9674 the author refers to both an 800 MCM/year and a 900 MCM/year minimum flow requirement. Which is it?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 9661, 2010.