

## ***Interactive comment on “Urban water sustainability: an integrative framework for regional water management” by P. Gonzales and N. K. Ajami***

### **Anonymous Referee #1**

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The authors have tried to develop an integrated framework to evaluate the sustainability of urban water supply systems and to address the complexity of hydrologic, socio-economic and governance dynamics surrounding water management issues. The authors have suggested a quantitative indicator to "measure" the sustainability of urban water supply portfolios. The suggested indicator has been applied to evaluate the sustainability of the Hetch Hetchy Regional Water System in the San Francisco Bay Area of California under a few scenarios.

The contribution is interesting but hard to evaluate yet. Some major revisions seem necessary before the quality of the work can be judged. Here are my major comments.

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- The work is about urban water supplies in general and the Hetch Hetchy system is just a case study to show how the developed framework works in practice. But the introduction starts with the discussion of California! I suggest that the authors revise the introduction, make it more general, and provide a picture of the challenges in urban water supply systems at the global level, not California.

- The work generally lacks a comprehensive literature review. When talking about California, I wonder why none of the major studies of California's water system has been cited here. The water resources management literature is full of studies of different aspects of California's water system. When talking about sustainability assessment and monitoring in water systems, I wonder why the authors do not review the state-of-the-art. The authors need to identify the gap, justify the need for this study and clarify its major contribution (value added).

- The literature is full of sustainability indicators. What is the value of having another indicator? Why don't the authors compare their indicator with the existing ones to prove that their indicator is any better or can provide some information that other methods don't?

- The literature also includes papers that strongly discourage quantifying sustainability and using "state" indicators (as opposed to "process" indicators) in water systems (e.g. see different papers by Peder Hjorth). The authors need to say why they have chosen to quantify sustainability despite all the limitations of quantitative indicators as discussed in the literature. What are the caveats that readers need to know about this new quantitative framework?

- The adoption of Gini-Simpson index must be justified. What are the pros and cons of using this index. What has this index offered to other fields that makes its adoption valuable here?

- The authors need to explain each equation carefully and tell the reader what these equations and indicators mean. For example, what are the possible ranges of de-

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mand/supply diversity? What values are better. I have a hard time relating to the different numbers I am seeing in this paper as I do not know the possible ranges, the significance of differences in values, etc.

- The authors suggest an indicator and then evaluate a system with such indicators and make some conclusions about that system. How can one trust the indicator at the first place? What proves that the suggested indicator is a good 'measure' of the system's sustainability? What is the major policy implication of the numbers produced here? Finding out that diversifying the supply portfolio is good for the system does not require a new index. This is already in the literature and has been studied based on economic measures which are used by utilities in practice to make decisions.

- There is a need for a comprehensive review of the existing indicators and a comparison which can help the reader understand what is getting better here. Otherwise we all fall in the "indicator development" trap which seems to be the new business of many of us in the field. Having too many indicators is dangerous as we cannot compare apples and oranges.

- I think claiming that social factors have been incorporated in the developed framework is too ambitious. Statistical analysis and PCA cannot really tell us about the social dynamics of water management systems.

- It really helps if the authors evaluate the system under various (more) scenarios to give the reader a sense of the sustainability values. An increase from 0.3 to 0.5 does not mean anything to me. How valuable is that? How higher can that number become? How much are the utilities willing to spend to raise the index from 0.4 to 0.5?

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 11291, 2015.