

***Interactive comment on “Development of a participatory Bayesian network model for integrating ecosystem services into catchment-scale water resources management” by Jie Xue et al.***

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This manuscript reports the outcome of an in-depth and extensive process of stakeholder engagement, translated into a Bayesian network model of a catchment-scale water resource management situation in the Qira oasis area of western China. The aim of the study was to establish an ecosystem services-based IWRM framework supported by the BN model. Components of the framework include identification of the water related services and the analysis of trade-offs between these and other services. Over an 18 month period the researchers met with stakeholders to identify key vari-

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ables and design the model logic and then to evaluate the model results and scenarios for balancing water use.

The results of the model for the current scenario illustrate the limitations of the available resource to simultaneously meet water related ecosystem services as well as consumptive demands related to agriculture and local green infrastructure. The model was then used to evaluate other scenarios with stakeholders, illustrating the extent and type of trade-offs required when prioritising one or another water demand. No scenario was able to produce a situation acceptable to all stakeholders. The authors weigh the advantages and disadvantages of using BN models in such a participatory process, emphasising the time and cost associated with proper model development.

The framework is quite basic and applies BN models in a widely used manner. It is therefore not a novel framework but does represent an interesting application in the Qira area. The results and discussion topics are also common in such BN model applications. Another common feature of the study is a level of complexity and opaqueness in the model that makes it difficult for readers to unpack and understand the analysis and results.

My main recommendation for the authors is therefore to provide additional information (in a supplementary file) to better explain the various nodes and causal linkages. Supplementary data and explanations should also be provided for the CPTs.

Additionally, the methodology for applying the scenario management reported in Table 3 is not clear. Were the input intervention variables simply turned on or off and the effect noted? “Building reservoirs” is labelled an intervention variable but is itself dependent on other intervention variables included in the table. More detail on how the scenarios were analysed would present a clearer picture to readers.

I also offer the following observation to help improve the manuscript.

Pg 4 line 16: The statement that desert vegetation “protects” agriculture is provocative.

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Additional explanation would be helpful here.

Pg 5 section 2.2: The first paragraph of this section is too basic. BNs are sufficiently established and known. I recommend simply noting the methodology used and not explaining the value and rationale of BNs.

Pg 6 line 22-23: I wish there was “wide acceptance” of the dependence of human well-being on ecosystem services, but I don’t know what evidence supports this. There has certainly been a lot of academic attention, arguments made by NGOs, and language introduced into policy. I suggest changing this to “growing acceptance”.

Pg 6 line 24: Being explicit about which services cannot be substituted would be helpful here, because of course many can.

Pg 8 line 33: Public participation has “always” been crucial to IWRM. It is one of the fundamental principles. This is then mentioned again on pg 9 line 1. Check manuscript for redundancies, which are common.

Pg 11 line 3: “many rounds” of stakeholder meetings are mentioned but I see evidence of only two rounds in Table 2. Is there another stakeholder process not represented in Table 2?

Pg 11 line 13: It is an exaggeration to cite 3080 potential links because they are only potential if there is a meaningful relationship. I suggest deleting this sentence.

Pg 11 line 25: “and then analysed” What analysis was conducted?

English is generally quite good but a careful review and correction of grammatical errors is needed. E.g. pg 5 line 5, pg 8 line 17... many more.

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