

Interactive comment on “A risk assessment methodology to evaluate the risk failure of Managed Aquifer Recharge in Mediterranean basin” by Paula Rodríguez-Escales et al.

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General Comment: The paper proposes an interesting application of Fault Trees and Probabilistic Risk Assessment methodologies to evaluate the risk of failure (i.e. need to stop operation facility) for Managed Aquifer Recharge (MAR). As novel aspects (at least to me) there are (i) the integration of both technical and non-technical aspects that could lead to failure and (ii) the quantification of the probability of such events on the base of experts/managers opinions. This last point could be controversial since, as correctly stated by the Authors at line 13 at pp 9, doing so the analysis is based on the ‘perception of risk’ rather than the ‘actual risk’. I leave to the Editor the task of

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judging if such approach is ‘acceptable’ or not, while I have really appreciated it and the related results and conclusions. Moreover, note that the Authors precisely state that their approach is a dynamical one, where as a first step critical combinations of event are highlighted in the Fault Trees and, eventually, further investigation for such events are conducted with the aim of investigating the ‘actual risk’. Furthermore, the definition of the ‘actual risk’ of each event in the proposed Fault Trees (65 events both technical and non-technical) could be really challenging! That is why I appreciate the practical cut of this paper. I would recommend the publication after the Authors address some minor comments listed below.

Comment 1: Would it be possible to evaluate the MAR’ failure probability on the base of the results in Fig. 1? I intend that frequency of events (based on the literature review and not the managers opinions) as the probabilities of each event ‘unconditional’ from the specific manager opinions. Maybe these frequencies/probabilities are more general and less conditioned by the manager point of view. Interestingly enough from Fig. 1 it seems that technical aspects are more frequent than the non-technical ones, while the analysis based on the managers opinions suggest an opposite behavior! (does bureaucracy and legislation bother the technician/managers more than technical problems?) I suggest the Authors to perform the analysis on the base of Fig.1- frequencies if they think I would be of interest.

Comment 2: In the introduction the Authors state that in Probabilistic Risk Assessment (PRA) the risk is defined ‘as the probability of an undesired outcome to happen (evaluated in percentage of occurrence, return period, etc.) and an evaluation of the potential damage that a particular outcome might cause (amount of damage, adverse health effects, etc.)’. I agree with this definition, but in the rest of the work it seems to me that the Authors deal only with first part, i.e. definition of probabilities of failure, and not with the evaluation of the potential damage, that would lead to the risk. I suggest to add a statement about this point or to review the terminology throughout the paper since, to me, it seems that probability of failure is the right wording instead of risk of failure.

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Note that in Section 3.3 the Authors only deal with the probabilistic representation of the fault tree and no mention is done to the evaluation/representation of the potential damage.

Comment 3: At line 9-10 at pp. 7 the Authors state ‘it is very relevant to state that these preliminary numbers (i.e. probability of events assigned by managers or local people opinions) should always be on the conservative side, meaning that the less technical the evaluation is, the more caution should be included in the actual figures’. I agree with this statement, but immediately started to wonder ‘which is the conservative side? Is it the high probability of failure of the MAR facility (e.g. as wished by some local people) or is it the low probability of failure (e.g. as wished by investors)?’. What do the Authors think about this point?

Comment 4: I really appreciate the description in Section 3.4 of the dynamicity of the proposed approach!

Comment 5: Section 5.1 risk probability assignment. From the provided text is not clear to me how ‘the qualitative answers were then translated to absolute values of probabilities, in coherence with the importance of the event in a potential failure of the facility’. Could the Authors elaborate more on the way they assigned probabilities in the fault tree starting from the experts’ opinions? This point could be useful and relevant to interested readers.

Comment 6: Please increase the quality of the writing part in Fig.2, Fig. 4 and Fig. 6. It is really hard to read them.

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