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Interactive comment on “Irrigania – a web-based game about sharing water resources” by J. Seibert and M. J. P. Vis

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Games have proven to be good learning contexts, allowing a usable synthesis between real worlds and classroom logistics. Game environments have been developed for several practices, and water is probably among the fields with a higher number of games. Seibert and Vis mention a few of these. Two others that I would consider worth discussing are the Irrigation Management Game (Burton 1989, 1994) and the (quite similar) River Basin Game. These two games are also designed to experience - the difficulty of - water sharing, and also show the results of strategic actions of players in terms of gains.

Starting with a similarity between all these games, one which is (repeatedly) mentioned by the authors as well, all games simplify reality. Remarks along these lines are made

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by Seibert and Vis on page 1962, 1964, 1966 and 1972. My problem with these remarks is not that they are not relevant, but rather that they state the obvious. It is not that interesting to note that games simplify reality, but rather how they do so. There are a few aspects, however, in which the two games may differ from Irrigania.

Irrigania seems to take the "tragedy of the commons" idea as a starting point. Apart from problems of a more theoretical nature with this concept, which go too far to discuss here, the tragedy idea in the game is shaped as predefined effects of user strategies in terms of water source use, irrigated fields and possible gains. Overuse effects are predefined, and seem to affect all players within a village equally. I have two questions on this. First, could the authors provide more detail about the numerical aspects of the relation? How much do players typically "loose" when overusing, what have the authors seen when playing the game, what does a winning farmer have more than the others? Second, in case I am correct in assuming that effects are equal for all users, is that realistic enough? I do not know any real world system that distributes gains and losses equally over individuals - or villages for that matter. In case the game does not allow for effects between users and villages, differential access to water resources and differential profits are missed. In the Irrigation Management Game and the River Basin Game, differential access is an essential element. Upstream users have different options compared to downstream users (compare with Janssen et al 2011). Furthermore, overuse of the resource is not expressed indirectly through gains, but rather directly in water being available or not for players. What they do with the water is their choice. These games do only focus on surface water flows, which makes it slightly easier to model effects of water use, but even in groundwater use issues of control and access would be important.

Irrigania appears to be based on assumptions that 1) there is a best solution for a game setting and 2) results of actions need to be quantified. Both are mentioned on page 1963 (lines 6-7 and 19-20 respectively). I do not think that I want to disagree with either of these assumptions - at least not in game settings where simplification is required

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- but I would like to check what this means for the way the game simplifies reality. In real-world contexts, even numbers are evaluated differently by different actors. In real-world settings, unrealistic solutions can also be created in non-numerical ways - as has been shown by many engineering designs that were perfectly feasible on the numerical side, but failed in terms of political support. I do realize the difficulty of taking non-numerical issues into account when designing a game as Irrigania. What I like about the Irrigation Management Game, which I use myself in class, is that the numerical aspects are pretty well defined - especially the relation between water use, crop responses, market prices and total profits - but that the game setting allows for many socio-political arrangements defined by players when playing the game - like water selling, bonding, secret arrangements, etcetera - which creates a best solution every time anew. The numerical results of strategies are not pre-defined. It is not entirely clear to me how this would work in Irrigania, but there seems to be considerable pre-definition in what would be the best solution.

A final, perhaps smaller issue is how the game setting itself influences the game outcomes. The more isolated a player acts, the more individualistic his/her strategy may become, as indicated by the authors (based on rather old references I would say). Nowak (2011) discusses several mechanism he encountered when studying series of repeated games - as most real-world practices are - where cooperation appears to be the "winning" strategy (in terms of survival!). These mechanism do require/are built on the notion that people know each other, can see each other, or at least have partial access to each other. The two games I introduced use spatial closeness explicitly allowing players to interact. The games may reduce real-world irrigation systems or river basins of many square kilometers to one room, but even in one room organizing co-operation appears to be rather difficult. Does a web-based setting stimulate individual strategies, or perhaps hamper cooperation? I do not know the answer to this question, but it may be necessary to take it into consideration.

Please do not get me wrong, I do like the general setup of Irrigania, and I like the

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options for players to exploit different water sources in particular. Very often, farmers do use more than one source, and we all know the use of groundwater has risen dramatically over the years. This may be the first game that allows such conjunctive irrigation strategies. Studies have shown, however, that surface and groundwater use is closely linked to access to these different sources (for example see Kazmi (in press)). I would like to suggest to Seibert and Vis to study options to explicitly include such differential access to water sources in the Irrigania game.

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