

***Interactive comment on “Assessment of
alternative land management practices using
hydrological simulation and a decision support
tool: Arborea agricultural region, Sardinia” by
P. Cau and C. Paniconi***

Anonymous Referee #2

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Comments on Paper:

Assessment of alternative land management practices using hydrological simulation and decision support tool: arborea agricultural region, Sardinia

General Comments There are many problems with this paper - I do not believe that it is publishable in its current form. I do have an annotated manuscript that I can supply the authors, but there seems no way of doing this via the system. The major shortcoming is in the description and application of the modelling system. This aspect is detailed

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below with minor comment on some other aspects.

Comments on the modelling approach: Firstly, a description of the catchment-HRU configuration and a map is required. How were HRU's derived and how many are there? Have the authors simply followed some automated GIS process of combining land and soil information? Are all identical HRUs lumped for modelling purposes or are they truly spatially distributed and then modelled separately with the output from each (streamflow, nitrates etc) routed according to the stream network. How are abstractions and reuse accounted for in the model? How do the authors link the output with the streamflow gauges for the calibration exercise?

Similarly, it is not clear how the climate input data are allocated/weighted for each HRU? With regard to rainfall data, the authors need to show that the disaggregation of monthly rainfall to daily is sound by comparison to observed data from the available rain gauges. At the least, mean monthly and annual values should be preserved in the synthetic daily rainfall file. It is not clear what the time-step for the observed streamflow data is - is it annual? Or monthly? It seems to be annual, but there is a statement that the timing and magnitude of seasonal water yields was captured - but then, what is the benefit of using a daily model in this exercise?

The model is being reported as being calibrated following a "regional scale approach" - this needs clearer explanation in the light of my questions regarding the spatial representation of HRUs above - and in particular, how these are linked with the streamflow gauges.

The authors state that changes in the values to the parameters (AWC, ESCO, CN) were only accepted if they resulted in an improvement in the N-S index - but what was the basis for changing these parameters? It is stated that "The physical processes associated with water movement, sediment movement, crop growth, nutrient cycling, and other phenomenon are directly modelled by SWAT" and that the subdivision to HRUs "increases accuracy and gives much better physical description of the catchment's wa-

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ter balance and water quality”. Consequently, it is implied that these parameters should be representative of the HRU according to the physical characteristics of the soil/land use etc thereof. Thus there should be no need to change these parameters. In reality there is always some degree of “parameter tweaking” that takes place in such modelling. However to alter these parameters merely to improve some measure of statistical fit flies in the face of attempting any physical representation of the catchment, particularly if the N-S index is calculated on an annual basis. Are the changes in values for these parameters within the ranges suggested by the model developers? The authors should refer to the SWAT web site and in particular to the section on model calibration. Typically, the approach in similar modelling studies is to calibrate at one streamflow gauging station and validate (many people prefer term verify, but I won’t debate the terminology here) at another nearby, or to split the observation sample and calibrate on one half and validate on the other. The approach followed here does not provide any basis for extrapolation beyond the range of the calibration exercise. This is critical to the rest of the paper as I do not believe that there is any valid basis on which to accept the simulation output. Furthermore, it is implied that because the water balance is “adequately” represented that the water quality output is acceptable- this is not true. Thus, there is no confidence in the pesticide or nitrate output unless some other form of validation is provided. Calibration of the model to represent the water balance is only the first step in a model validation exercise. In the context of this study, the authors also need to extend this work to include the water quality parameters.

General comments

Layout and logical order is poor. Often information that the reader requires appears later in the paper e.g. time step of the study.

The figures are poor. Firstly, for an international audience a better location map is required. Secondly, the legends etc from the GIS derived map are far too cryptic and will make little sense to most readers. The authors do state that the USDA and FAO guidelines were used, but few people carry these in their heads. Why not simply pro-

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vide something most readers can interpret e.g. sandy clay, deep sand etc rather than VT003/VT004 etc. Similarly for the landuse - what is AGRC or VINS provide something the reader can understand. A map showing the HRU's must form part of the paper. Why are weirs/runoff measuring sites not shown. What is the difference between climatic and rain guages?

The literature used is not adequate. There is a wealth of literature on the application of SWAT and similar models. The authors need to access these and consider their findings/recommendations, particularly in the context of the comments re: model calibration/validation above.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 747, 2007.

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