

Interactive comment on “Water harvest- and storage- location assessment model using GIS and remote sensing” by H. Weerasinghe et al.

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Review of the article:

WATER HARVEST- AND STORAGE- LOCATION ASSESSMENT MODEL USING GIS AND REMOTE SENSING

H. Weerasinghe, U. A. Schneider, and A. Löw

Reviewer: Attilio Castellarin

GENERAL COMMENTS

The manuscript proposes a raster-based GIS tool for identifying optimal potential lo-
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cations for water harvesting and storage facilities, and presents two applications. The optimization and planning of water-storage facilities location is definitely a problem of broad international interest. The idea of developing a GIS tool that enables one to obtain approximate indications at large geographical scale on suitable location for water storage facilities taking into account soil characteristics, topography, land-cover, (in principle – see below) climate and hydrological response is definitely an intriguing and useful one. Nevertheless, in my opinion the manuscript is not acceptable for publication due to some fundamental theoretical limitations that seriously hamper the technical soundness of the study. Also, I regretfully have to point out that the manuscript is rather poor, both stylistically and linguistically, and poorly prepared. Repetition of paragraphs should not be detected during the reviewing process.

I report my comments below, distinguishing between two major points and specific remarks. My recommendation as a reviewer is to reject the manuscript and to invite the authors to resubmit a deeply revised and reworked paper, perhaps considering international journals with a special focus on the presentation of original algorithms or software for water related problems.

I sincerely hope the authors will find my comments of use while revising their manuscript.

MAJOR COMMENTS

(1) I find the suitability of the SCS-CN method for this framework to be questionable.

I hope I misunderstood the presentation of the study, but I seem to understand that the potential runoff production is evaluated by applying the classical SCS-CN method at monthly timescale. The model is unsuitable for this purpose as it is well known that SCS-CN method is an event-based approach (e.g., “It is widely used and is an efficient method for determining the approximate amount of direct runoff from a rainfall event in a particular area”, http://en.wikipedia.org/wiki/Runoff_curve_number) that ignores evapotranspiration, which may be extremely significant at monthly timescale.

Modifications are needed to adapt SCS-CN for continuous simulation (e.g. Moretti and Montanari, 2007) and, hence, for an application of the method at monthly timescale. As I already said above, I hope I misunderstood the presentation, if not, this is a serious theoretical concern.

(2) The presentation of the proposed approach is poor.

When a methodology, a procedure, or a GIS tool is presented for the first time, theoretical principles and guidelines for its application (in different hydrological contexts: e.g., smaller catchments) should also be presented and illustrated in detail. In my opinion, this part is totally missing. Within the section "Methodology", the manuscript simply presents how the methodology was applied to the two case studies (see subsection 2.3 and sub-subsections therein) prior to presenting the case studies themselves and without illustrating general guidelines for application elsewhere, in catchments with significantly different morphological features or areas. The presentation needs to address these points.

SPECIFIC REMARKS

- p.1, line 13: "spatially explicit spatial analysis model", redundancy?
- "Geographic Water Management Potential", consider using hyphenation, not immediately clear what potential refers to.
- p.1, line 23: "potential water harvesting- and storage sites", here and elsewhere, revise to make the text clearer (potential sites for...?)
- p.2, lines 14-16: please revise. Plus, vector-to-raster conversion is a very simple task in several GIS environments. Is the statement really useful?
- p.2, line 24: please revise the beginning of the sentence.
- p.2, line 33: the introduction of SCS-CN method here looks like an abrupt jump.
- p.3, line 9: "Runoff is calculated endogenously in GWAMP model using the SCS-CN

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method". Unsuitable for monthly timescale. Evapotranspiration?

- p.4, line 28: repetition, plus how is the raw score computed
- p.5, lines 5-6: Revise
- p.6, line 18: "1km", suitable for the main goal? Applicable elsewhere? Provide guidelines and references. See major point (2)
- p.6, line 21-26: REPEATED PARAGRAPH!! WAS THIS MANUSCRIPT EVER RE-READ?
- p.7, line 1: Revise
- p.7, lines 2-3: really useful?
- p.7, lines 3-4: The algorithm needs a depressionless DEM? Why? Please explain. Why interpolation is used among other alternatives?
- p.7, line 13: "...surface to create contour lines in 10m intervals in raster (grid) format", is 10m suitable for applications in general? Applicable elsewhere? Provide guidelines and references. Plus, the sentence is unclear, contour lines in raster format on a 1m pixel?
- p.7, line 29: slope in degree or in percentage?
- p.8, line 6: principal? Are the information on the arc minutes important?
- p.8, lines 10-16: see major point (2)
- Runoff data: see major point (1)
- Sao Francisco catchment at?
- Nilo catchment at?
- p.11, line 24: Table 4?

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- p.13, line 19: "order tributaries", hydrological tools in GIS environments enable extraction of river networks and stream order classification automatically, and this information could be effectively used within your approach (additional information) instead of using it in validation.

- p.13, lines 25-29: REPEATED PARAGRAPH!! WAS THIS MANUSCRIPT EVER RE-READ?

- Conclusions: "The application of GWAMP in the two case studies demonstrates its suitability to identify potential sites for rain water harvesting and storage." The take home message is misleading, only water storage was verified, in two case studies, and the analysis, as it is described and presented in this manuscript, is not replicable elsewhere nor in the same catchments considered in the study. I do not think the term "demonstration" is suitable in this context. Conclusions need in my opinion to be significantly revised.

- Sherda et al. (1993) appears to be missing

- Table 1: explain acronyms

- Table 5: 100,00% of Sao Francisco catchment is potential suitable area?

- Figures 1 and 2: Legend is misleading, white areas are associated with "watershed boundaries"

REFERENCE

Moretti, G.; Montanari, A. (2007) A spatially distributed grid based rainfall-runoff model for continuous time simulations of river discharge, ENVIRONMENTAL MODELLING & SOFTWARE, 22(6), 823-836 , DOI: 10.1016/j.envsoft.2006.02.012.

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