

Interactive comment on “Urban hydrology in mountainous middle eastern cities” by T. Grodek et al.

Anonymous Referee #2

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GENERAL COMMENTS

This article deals with the impact of urbanization on runoff generation processes and on the potential groundwater recharge in two mountainous Middle Eastern cities. This research assesses relevant scientific questions, which are within the scope of HESS. Measured hydrological data is presented to assess the impact of urbanization, and the hydrological response in urban areas is compared with the response in natural areas. The authors determine that the two investigated cities are typical examples of many Mediterranean areas and propose hydrological guidelines for urban development in this region. Nevertheless, several points need clarification before the paper is considered for publication. For instance, the uncertainties associated with the results (see specific

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comments) should be better assessed and clarified. Moreover, the large number of “major” technical errors proved that the paper should be deeply revised (e.g. up to fifteen references cited in the text are not present in the bibliographic list).

SPECIFIC COMMENTS

2 Study area

I think there is an unbalance between the description of the global (~ 50 lines) and the local (~ 15 lines) contexts. Moreover, several characteristics listed in the global description are not necessary to understand the article and, inversely, the local characteristics are insufficient to correctly grasp the local hydrological context.

3 Methodology

3.1 Maps and urban surveys: If I understand it correctly, no information is available concerning the natural topography of Ramallah prior to urbanization. In this case, how is it possible to determine DDn (pre-urbanization drainage densities) for Ramallah? (cf. 3.4)

3.2 Rainfall: With the available information, it is difficult to judge the quality of the two rain gauges network retained (What is the altitude difference in Ramallah for example?). Despite the different topography of the two areas studied and the potential spatial variability of the rain, the number of rain gauge for the two different cities are unbalanced (3 for a 8.4 km² watershed against 9 for a 0.61 km² watershed). Moreover, the formula used to determine the rainfall in Ramallah seems not correctly referenced (the references are not in the references list, could you please correct that?).

3.3 Runoff quantity and quality: With the information in the text and the associated figures, it is difficult to understand the hydrology of the investigated areas (watershed boundaries and sub-watersheds ... etc.) and how representative are they for the two cities.

3.4 Drainage Density Index – DDI: The method for calculation of DDn is not clear (raw

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data used, threshold used for the streams determination). The DTM 25 m mentioned in this section is not mentioned in the section 'Map and urban surveys 3.1'. Finally, how did you determine the D_{Dn} with a DTM 25x25m for the small watershed studied? (i.e. LS more or less 150 pixels)

4 Results

4.1 Rainstorms: In Ramallah, I think that the "good" correlation between MR and VR in the first season is just due to the two extreme high points. If you delete these 2 points, the slope seems to be near to 1 (and not 1.8). In the same way, the reconstitution of the rain for the second year seems biased.

4.2 Rainfall-runoff relationships: Taking into account the previously mentioned problems, it seems it would be appropriate to reformulate the results: Ramallah: rain reconstitution problem (see correction of 4.1) Modiin: Do you speak about station M-I or M? the text and the figure do not correspond.

4.3 High magnitude events: The problem for the Ramallah LS (limited inlet capacity) could be better explained.

4.4 Hydrograph shape: It seems that the comparison for different hydrographs proposed in Figure 7 in term of impact of "geometry of the urban drainage network" was biased because of the spatial scaling effect (watershed of 0.11 and 0.41 km² in Ramallah against a watershed of 8.4 and 5.5 km² in Modiin) and differences in the rain events. Moreover, the explanation of the hydrograph shape for Ramallah WA Station seems wrong. The authors say "a more complex road network generated secondary, smaller peaks" but I think that the second peak was simply due to the second rain peak (see Fig 7b).

4.5 Urban Pollution: During the "dry season", the sewer pipe of Moddin station M is clearly influenced by human water. So, I wonder if it is the case for all the stations? Which is the impact of these potential water volumes on the estimated runoff coefficient?

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coefficients and other quantitative calculations?

5 Discussion & 6 Conclusion

I think that the discussion and the conclusion are too ambitious and the problems and uncertainties associated with the results should be further taken into account.

TECHINICAL CORRECTIONS

The reference list does not match with the references cited within the text: I counted more or less fifteen references that were cited in the text which are not present in the bibliographic list. In the same way, I could not find in the text ten references that are listed in the bibliographic list. Please, correct that.

Page 7310 line 5: what does it mean "Nari"?

Page 7312 line 3: the surface of 5.5 km² for the station I corresponds with the value listed in Table 2, but not with the values listed in Table 6. Is this a mistake?

Page 7312 line 11: the surface of 8.4 km² for the station M does not fit with the values listed in Tables 2 and 6.

Page 7312 line 12: the surface of 8.4 km² for the station "M-I" does not fit with the values listed in Tables 2 and 6.

Page 7314 line 22: The rainstorm of 107 mm for Ramallah does not fit with the value listed in Table 4 (109 mm).

Table 1: What do you mean for "Evaporation"? real evaporation? potential evaporation? evaporation or evapotranspiration? I would suggest changing the unit: from mm/d to mm/month

Table 2: What does it mean 'Percentage of Road Length'? There are no public, private and parks areas in Ramallah? This seems not clear, could you further explain this?

Table 4 and 3: The reference in the text to Tables 3 and 4 are sometimes inverted.. All

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the reference should be checked.

Table 5: The punctuation should be coherent through the manuscript: 24-26/2/03 not 24-26.2.03, check all the listed volumes and replace points by commas.

Table 1,2,3,4,5 and 6: I think you should always indicate the units in the same form, i.e. or in the table captions, or inside the table. Homogenisation would make the manuscript easier to read.

Table 2,3,5 and 6: The name of stations "M" and "M-I" are always different (M=M-I, M-I=M*, M=M, M-I=M-I). Please check these. I think that the best is to always indicate M and M-I and their respective information.

Figure 2: Rain gauge not rain guage. Where is the Station J? The Zooms on the urban center do not seem necessary. Moreover, the Zoom on Ramallah urban center is not really a zoom. Could you adopted for this figure a more detailed legend? i.e. list the different land use types, watershed border, . . .etc

Figure 4: Trend lines in white are not convenient. What does it mean station M in this figure? (M or M-I?). Please, correct this. In the title: LS not Ls

Figure 7: Which is the scale for the Figure 7 (a)? The information on the three maps seems to be different from Figure 2. The network design is not clear (eg. What does the arrow means? and the water flow? The driving way?)

Figure 9: Details should be provided to the reader about how did you define this conceptual model.

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