

## ***Interactive comment on “Delineating riparian zones for entire river networks using geomorphological criteria” by D. Fernández et al.***

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C1→ GENERAL COMMENT 1: TEXT. The text is difficult to read and lacks of a concise language. Concepts and definitions are sometime repeated and there is no structured scientific language driving the reader from the beginning to the end. I’m not a native english mother tongue, but I feel that the language should be also reviewed more carefully from a native english proofreader. In particular the text should introduce more clearly the novelty of this work (see GC.2) starting from a review of recent works available in literature on geomorphologically based floodplain DEM-based extraction methods (see GC.3).

Introduction has been modified accordingly and English has been reviewed by a native-

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English speaker.

C2 → GENERAL COMMENT 2: NOVELTY OF THE WORK. I do believe this work does include novel insights for the topic with specific regard to the objective quantification of the performances of the two proposed geomorphic models for riparian areas identifications, but this is not clearly highlighted in the text starting from the title. I suggest a less general title like "Quantifying the performances of an automated GIS-based geomorphologic approach for riparian zones delineation using DEMs".

The novelty of this work has been highlighted in the abstract and in the introduction. We also agree that the title suggested by the reviewer is more appropriate. However, we have used two geomorphologic approaches instead of one (BFD and PD), so the new title of the manuscript is: "Quantifying the performance of automated GIS-based geomorphological approaches for riparian zones delineation using DEMs".

C3 → GENERAL COMMENT 3: REVIEW OF LITERATURE, REFERENCES. A more carefully study of exiting papers on the topic would also support authors in highlighting what is really new here (see GC.2). In particular, the following works dealing with DEM-based preliminary (simplified) floodplain extraction methods and studies on the hydraulic geometry of floodplains provide valid reference works that should be carefully considered.

The review of methods for riparian delineation has been complemented with the suggested references. Hence, we have added the following paragraph in the introduction:

"...several GIS-based methods have been published in the last decade regarding floodplain/riparian zone delineation. Most of them rely on a Digital Elevation Model (DEM) and water level data. A common approach consist in using water level data observed at gauging stations or simulated in a hydraulic model at several locations and extended them over the floodplain by interpolating water levels at each DEM cell (Noman et al., 2001). Other GIS-based methods are based on algorithms which calculate inundation depth (Dodov and Fofoula-Georgiu, 2006; Nardi et al., 2006) or riparian width

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(MCGlynn and Seibert, 2003) for each stream cell. These algorithms are obtained by performing regression between catchment area (obtained by terrain analysis from a DEM) and water level or riparian width data at several locations.”

C4 → GENERAL COMMENT 4: VISUAL COMPARISON OF THE TWO GEOMORPHOLOGIC METHODS WITH STANDARD HYDROLOGIC MODELS. The visual and/or quantitative comparison of results is a central part of this work. I suggest to present in more detail the visual comparison of the different simulated floodplains. The standard hydrologic model is not well explained and submitted figures don't help the reader much in understanding the differences between the two different approaches. Please insert more detail in the text and review figures to provide more details.

We have added two new figures (new Fig. 2 and new Fig. 10) and deepened in the discussion of this topic.

C5 → Pag. 4046, row 1: please find synonymous for riparian that is repeated twice.

We have replaced

“Riparian zone delineation is a central issue for riparian and river ecosystem management”

with

“Riparian zone delineation is a central issue for managing rivers and adjacent areas”

C6 → Pag. 4046, row 10: add (DEM) after Digital Elevation Models

Done.

C7 → Pag. 4046, row 23: hydrological criteria is unclear. You want to say standard flood maps or reference flood maps or please define what you mean for hydrological criteria. If you refer to standard flood mapping you may also cite some reference papers like - Noman, N. S., E. J. Nelson, and A. K. Zundel (2001), Review of automated floodplain delineation from digital terrain models, J. Water Resour. Plann. Manage.,

127(6), 394–402

We have rewritten the sentence as follows: “Adjustment between the surfaces derived from geomorphological (BFD and PD) and hydrological (50-yr flood) criteria has been evaluated. . .”

C8 → Pag. 4046, row 24: It is not clear what you mean with "pointed out the same surfaces".

We have replaced

“Both methods have pointed out the same surfaces when looking for those that best match with the 50-yr flood.”

With

“Both methods have pointed out the same thresholds in BFD and PD approaches when looking for those that best match with the 50-yr flood.”

C9 → Pag. 4046, row 27: remove "considered"

Done

C10 → Pag. 4047, row 6: I'd substitute "vegetation" with "areas" and I'd remove "provides many services to society" → "Riparian areas are involved in different geomorphological, hydrological and ecological processes () reducing flood risk or"

We agree with the use of the term riparian areas, but we think that keeping “provides many services to society” it’s also important to highlight the importance of riparian areas not only for ecological purposes, but also for safety and economic reasons.

C11 → Pag. 4047, row 15-16: add references to present the works that have been published on the topic. As a result, I'd remove “..and consensus is still far from being achieved” with “There are however, several different approaches to delineate riparian areas (McGlynn and Seiber, 2013; Dodov and Fofoula-Georgiou, 2006; Nardi et al.,

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2006), but the developing of a standard methodology for a geomorphologic tool for preliminary floodplain mapping is still an open research topic."

This suggestion has been incorporated in the introduction.

C12 → Pag. 4048, row 5: There are several research works on the floodplain extents and associated parameters as a function of the contributing area, varying " : : from source to mouth: : :". You may find some references in Nardi at al. (WRR, 2006) but you may also find papers on the hydraulic geometry and scaling laws for floodplains.

See answer for general comment 3.

C13 → Pag. 4049, row 26: please review "there are not many published works". I suggest to be more critical here expressing your personal view in what is lacking in available methodologies. I may agree that there are not many and they are different, but I'd point out which is still missing while introducing the motivation behind your work. Here you may more clearly the objectives and novelty of your work as respect to the other similar works.

We have modified the text accordingly. Specifically, we have added the following paragraph in the introduction:

"To sum up, a wide variety of DEM-based methods are available for preliminary floodplain/riparian zone extraction. The quantification of their performance is usually provided as a regression coefficient among catchment area and inundation depth or riparian width. However, this is not enough to provide complete clarification of the adjustment among modelled and real floodplain/riparian zone (e.g which of the two floodplain surfaces cover a larger area? Where along the river network are located the better and worst adjustments?)"

C14 → Pag. 4050, row 4-11 These lines are the exact repetition of the abstract. Please review to avoid text repetitions within the manuscript.

To avoid repetition we have summarized these lines in the abstract as follows:

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“Objective quantification of the performance of the two geomorphologic models is provided by analysing coinciding and exceeding areas with respect to the 50-yr flood surface in different river geomorphological types.”

C15 → Pag. 4052, row 21: The DEM is a raster. Substitute "obtained from a DEM-derived raster" with "obtained from the DEM."

Done

C16 → pag. 4054, row 7: You define here the bankfull depth concept while the term was firstly inserted in pag. 4051 row 18. The definition should be inserted when the term is introduced for the first time.

Done

C17 → Paragraph of row 6-22: I'd insert a schematic figure representing your definitions of bankfull depth, valley floor width, floodprone height including the different ranges as a function of Rosgen type streams. This would definitely help in figuring what you are doing by adjusting your simulated surfaces with the reference floodplain surfaces. I'd also add a schematic diagram (flow chart) for describing the BFDAC method.

We have incorporated this suggestion by adding a figure (new figure 3). However, to make it easier and more visual, we do not include the different ranges as a function of Rosgen stream types.

C18 → PAg. 4055, row 4: fig. 3 is here cited before citing fig.2 This is not a good practice for scientific publications. I'd also insert a schematic diagram (flow chart) for describing the path distance method at the end of section 2.4

We have corrected this mistake

C19 → Section 2.5 title: Why "Data analyses". I'd rename this title for representing the adjustment of the surfaces. Something like "Geomorphologic floodplain surface

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adjustment methods" or a more concise title you may find

Methods has been reorganized and that section corresponds now with section 3.4 "Adjustment methods"

C20 → Pag. 4056, row7: Please define what you mean for cluster analysis when introducing Fig. 2.

We agree that the calling to old Fig.2 (new Figure 6) is confusing because it refers to the cluster (assigning cases into groups), not to the box plots. So we have moved the position of the calling to Fig. 7 in the text and we also have added the following sentence in the methods:

"PAM clustering was performed using different pre-established numbers of clusters (3, 4 and 5). Then, we analysed the characteristics of each cluster (geomorphological type) with respect to the four geomorphological attributes using boxplots."

C21 → Fig.2 must be recreated for increasing the quality of graphics and texts. It is not possible to read the text in fig.3. Increase size and resolution of both the image and associated texts

We have increased the resolution of old figure 2 (new figure 6) and old figure 3 (new figure 4).

C22 → Pag. 4058, row 3. "was fully achieved" I'd avoid the use of such conclusive remarks.

Discussion has been rewritten and special attention has been paid to that suggestion.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/9/C3759/2012/hessd-9-C3759-2012-supplement.pdf>

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 4045, 2012.

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