Natural Hazards
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Sciences

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Discussions

Interactive comment on "Effectiveness and efficiency of slot-check dam system on debris flow control" *by* Y. H. Zou and X. Q. Chen

Anonymous Referee #1

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General comments This is an interesting paper on the retention efficiency of slot check dams. Despite its interest, there are a large number of aspects that require improvement for its publication. A main issue is that the manuscript has not been written carefully and this is especially annoying to me as a reviewer. The english writing has not been revised by a specialist, there are even several incomplete sentences. This seems to me unacceptable. This implies a waste of time for the editors and reviewers. A second key aspect is there is not a thorough explanation of capital concepts of the manuscript (the efficiency term, variables, equations), being this negligence again an obstacle for an appropriate understanding of this work. In some parts, the work is obscure and this reduces its effectiveness in conveying their findings.

Specific comments

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* TITLE - please define what is efficiency and effectiveness in check dams. The efficiency has been defined in Equation 1 and onwards, but no reference to effectiveness is made. This is essential since it is included in the title and throughout the study. Also, I'm not sure if efficiency is appropriate for its use in the paper. It is defined as the relative contribution of the volume stored in one check dam to the volume in a whole subsystem. To me the efficiency analogy here is very weak. It makes more sense when it is defined for the system, because it implies how many sediments the check dam system is able to trap from all the amount available in the catchment Vo.

- I would add 'a slot check dam system' in China, since it is a specific case. In its current form, the title seems too general

0. ABSTRACT

- Line 1 :I miss articles in the beginning of many sentences or the plural form such as in line 1 ('Slot-check dam systems are'). Please correct this all over the paper.

- line 12: What are 'Evaluation models'? To me conserving efficiency does not sound right, maybe (sediment) retention effciency might be more suitable.

1. INTRODUCTION

- Line 2, pg. 5779: a list of references should be included in chronological order, from the oldest to the newest. Please correct this all over the paper.

- Maybe the objectives might better presented: 1) Analysis of the efficiency through survey measurements; 2) Estimation of the efficiency using a model or something similar. Please specify, the specific objectives of the manuscript.

2. STUDY AREA

- To me it is confusing refering to the catchment as a river basin (line 12, pg. 5780) and a gully (line 18, pg. 5780).

- I do not understand the exact meaning of rainstorm and rain shower. Where comes

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the other half of total annual precipitacion from? What's the meaning of annual rate of rainstorm?

- line 4 pg 5781: What is the 'river trench', you mean the stream where the check dams were built? Please, be more consitent defining the geomorphological elements in the study.

- Line 12, pg. 5781: Who built the check dams?

- No soil or geological information is given to describe the basin. According to Figure 7, geological settings might be important for the design.

3. METHODOLOGY

- Line 15, pg. 5781: This sentence is an objective, not methodology. Here the authors use effectiveness, not efficiency. Again, a lack of clarity in the exposition.

- Line 16, pg. 5781: Please, describe the field survey carried out: variables measured, technology employed.

- line 19, pg. 5781: Stability resista'nce'? Is not enough stability to impacts?

- line 22, pg. 5781: incomplete sentence

- All the equations must be immediately followed by the definition of each one of the variables included. This is an extra difficulty to understand their meaning.

- A big issue for me is the meaning of the Possible surface erosion volume of the region Vo. This key concept is not clearly explained. Again, there are variables not defined.

- line 6, pg. 5783: why the shape factor is related to the erosion ability of debris flows?

- line 13, pg. 5784: Which experimental tests?

- Line 17, pg. 5784: This sentence is incomplete.

- Line 5, pg. 5786: In which sense a layout is optimal? Which variable is maximized or

minimized? Following the line proposed in this work, an optimum might be found considering the number of check dams and their retention capacity maybe using simulations of different locations and sizes of check dams and analysing the volume trapped. Thus, finding this optimum might imply reaching the maximum retention efficiency for a minimum cost (with check dam height as a proxy, for instance). Also, probably it would make sense to define the target sediment to be trapped, since slot check dams are designed to trap a specific range of sediment sizes to reduce specific hazards. Therefore, the volume included in the efficiency might correspond only with a certain size interval. Slot dimensions might be also an aspect to be considered in the optimization, not only number, location and height of check dams, since they determine wich fraction is actually trapped.

- The figures are not referred in order. Figure 7 (line 6, pg. 5786) and Figure 8 (line 14, pg. 5786) comes earlier than Fig. 3 (line 19, pg. 5787) and others. This complicates the reading.

- In Equations 24 and 25, variables again are not defined.

4. RESULTS AND DISCUSSION

- Line 6, pg. 5787: This sentence corresponds to methodology.

- Lines 23-23, pg. 5787: Justify the statement on the importance of bank contribution as sediment sources. Field measurements or observations?

- Lines 15 to 26, pg. 5787: corresponds more to introduction than results.

- Line 1, pg. 5788: What is the meaning of equilibrium deposit? If there is more deposition in further rainfall events, would that mean that the equilibrium slope changes? Does Figure 5 corresponds to the field survey measurements?

- Line 6 and 7, pg. 5788: this sentence should be included in methodology.

TABLES

- all tables should include abbreviations to facilitate the reader their interpretation

- Table 1: B is the average width of the stream? Which is the origin of the discharges provided? How were they estimated?

- Table 3: In this table the efficiency is defined as the ratio between the deposits height and the dam height. However, in the paper the efficiency was defined as the ratio of volumes. The different efficiencies should be clearly defined. To me, it seems that these efficiencies mean different things:1) the relative contribution of one check dam compared with the total; b) the percentage of dam height used for the deposits along its lifetime; c) The percentage of annual sediments trapped by the dam. The authors would make a good contribution by defining the differents aspects involved in these calculations.

FIGURES

- Figure 2: Are these really slot check dams? Regular check dams all include several holes to favour the drainage of the structure. Altough I have no direct experience with open check dams, I was expecting a higher percentage of slots (linear openings) in the structures. This aspect is central also, since it would question the title of the manuscript.

- Figure 7: I do not see the point of this figure. In my opinion, the design procedure is far from clear. It lacks of specific quantitative criteria to define the number or location of the check dams, for instance. I would give another thought to this figure to make it more meaningful.

Minor corrections

- Please, revise the english all over the paper with a specilist.

- Include articles (a or the) at the beginning of sentences when required.

- Line 23, pg. 5778: remove 'to' before inundate

- Check that all the variables are defined in the text and tables

- Line 17, pg. 5786. : distance?

- Line 11, pg. 5788: lower

- Line 13, pg. 5788: reservoir

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