

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
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Comment on nhess-2021-47

Anonymous Referee #2

Referee comment on "Rapid assessment of abrupt urban mega-gully and landslide events with Structure-from-Motion photogrammetric techniques validates link to water resources infrastructure failures in an urban periphery" by Napoleon Gudino-Elizondo et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-47-RC2>, 2021

In this research, the authors investigate the occurrence of two mega gullies and one deep-seated landslide in an urbanised watershed. They show that these three mass movements, although outliers in term of size in the watershed; are processes associated with non-exceptional rainfall events. The failure of water resources infrastructure (WRIF) is shown as playing a key role in their occurrence, exacerbating the influence of rainfall. The contribution of these three mass movements is important in the overall sediment budget of the watershed. In terms of methods and techniques, the research is based on the acquisition of very-high spatial resolution topographic data from UAV and SfM processing and the use of a process-based erosion model.

This research that clearly stresses the role of human activities on the occurrence of hazardous geomorphic processes of climatic origin is an interesting topic that falls well within the scope of NHESS. However, at this stage, although this research brings interesting information, it still suffers from weaknesses; which leads me to the conclusion that the material presented here is not ready for publication.

First of all, the study is rather descriptive and does analyse the role of WRIF in isolation without really questioning the importance of other factors such as overloading, the pervasive leak iof the water system, the latency between the time the environment is built and the slope/erosion process occur, etc. We would welcome deeper analysis with regard to these processes, especially in a timeline perspective, and expect reference to the relevant international literature to support and discuss the observations. For example:

Demoulin, Alain, and Hans-Balder Havenith. "Causes and Triggers of Mass-Movements: Overloading." Treatise on Geomorphology (2021): in-press.

*Lacroix, P., Dehecq, A., Taipe, E., 2020. Irrigation-triggered landslides in a Peruvian desert caused by modern intensive farming. Nature Geoscience 13, 56–60.
doi:10.1038/s41561-019-0500-x*

Makanzu Imwangana, F., Vandecasteele, I., Trefois, P., Ozer, P., Moeyersons, J., 2015. The origin and control of mega-gullies in Kinshasa (D.R . Congo). Catena 125, 38–49.

doi:10.1016/j.catena.2014.09.019

Van Den Eeckhaut, M., Poesen, J., Dewitte, O., Demoulin, a., De Bo, H., Vanmaercke-Gottigny, M.C., 2007. Reactivation of old landslides: Lessons learned from a case-study in the Flemish Ardennes (Belgium). *Soil Use and Management* 23, 200–211.
doi:10.1111/j.1475-2743.2006.00079.x

A second point for improvement would be on the analysis of the DSM information that can help to better characterise the processes and discuss their mechanisms. Here the multitemporal information is only used to derived volume estimates and dimension parameters, while in can reveal much more than that on how a landslide or a gully has formed.

The analysis and discussion around the importance of these three mass movements on the sediment budget suffer from data bias. From three observations on a small watershed, general statements are difficult to be made. The authors need to be more nuanced and one would welcome extra information from the regional surroundings, for example on other landslides and erosion processes that occur there. For example, the landscape seems to offer ideal conditions for gully erosion and we can wonder whether the two mega-gullies are exceptional in size as compared to what occurred elsewhere in the city and in less urbanized areas.

An emphasis is brought on the used of SUV and SfM. However, there is not really an novelty here as these techniques are well known and, in this research, it is “just” applied to produce three DSMs over the three study sites. This methodological part should not be given a high importance and not be presented as a research objective in itself. Note also that it is not always clear on how the photogrammetric data were obtained and processed.

Technical details on how the climatic data and soil modelling data are processed are needed. It is rather difficult to understand clearly how the results were obtained.

The authors have already published several research papers on erosion processes over that study area and it is not always very clear, especially with regard to what concerns the modelling approaches and SfM methodologies, where the novelties are.

I have also made some comments and suggestions directly on the manuscript.

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2021-47/nhess-2021-47-RC2-supplement.pdf>