

***Interactive comment on* “Landscape scale remediation reduces concentrations of suspended sediment and associated nutrients in alluvial gullies of a Great Barrier Reef catchment: evidence from a novel intensive monitoring approach” by Nicholas J. C. Dorian et al.**

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Received and published: 29 September 2020

GENERAL COMMENTS FROM REFEREE 1:

The manuscript hess-2020-268 titled “Landscape scale remediation reduces concentrations of suspended sediment and associated nutrients in alluvial gullies of a Great Barrier Reef catchment: evidence from a novel intensive monitoring approach” has been reviewed. The manuscript is really interesting and fits in the broad scope of the

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journal. The authors present a detailed comparison analysis of two gullied areas in Australia: One remediated area and one control area. I consider that moderate/major revisions should be carried out before a final decision. Some important questions should be answered and small issues should be improved.

RESPONSE: Acknowledge.

The authors acknowledge this positive comment and have undertaken specific reconsideration to address the other key points raised by the Referee(see below).

SPECIFIC COMMENTS FROM REVIEWER 1:

Specific Comment 1. “One of my main concerns is the limited study period: only two years, and some limitation in sediment samples that were only recorded during three events. The authors stated this problem in the text, but I think that the limitations should be highlighted in the results and discussion section and also in the conclusion section. - I consider that the landscape scale remediation that has been carried out in this area, is really significant to understand all the process, and it should be noted. In that sense, I consider that: - Some photos should be included with situations before and after the reclamation activity (it is included the video, but I consider interesting to include some photos). - In the abstract, you should already inform about the remediate measures. - You should also discuss about the feasibility of this remediation work. Would it be possible to carry out this work in other study areas? Which was the cost of this remediation technique? – I don’t really understand the information that you provided in the lines 95-115. Is it about previous remediation activity? I’m not totally sure if this information should be included in this section or it should be moved to the introduction or event results section.

RESPONSE: Accept/Clarify.

The authors accept the suggestions by the referee and wish to clarify the following points:

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Two-year study period:

The authors agree with the referee regarding the relatively short timeframe of monitoring. However, the project was only funded for this time period. The authors mention in the abstract that the study represents a preliminary evaluation (Line 18) for this reason. The authors agree that more emphasis should be placed on this factor and will include discussion of this limitation in the Results, Discussion, and Conclusion sections.

Sediment samples collection:

The Referee indicates that sediment samples “were only recorded during three [flow] events”. A total of 207 suspended sediment samples were collected from 19 flow events during the study period. Therefore, the authors interpret that the referee’s comment is specifically referring to the collection of samples for nutrient analysis, of which three flow events were monitored. The authors agree with the Referee that three flow events is a relatively low number of flow events and will provide more commentary regarding this limitation and further explain the logistical and safety challenges that makes collecting a large number of nutrient samples from the site infeasible. However, the authors believe that the sample numbers collected from the three flow events (Remediated gully $n=14$ and Control Gully $n=26$) are sufficient for conducting a preliminary evaluation of nutrient water quality trends. The authors will revise the text to include the number of samples collected for nutrient analysis. Before and after photos: The authors agree that before and after photos of the Remediated and Control gullies are important. These photos are referenced throughout the document and are included in the supplementary information. The authors accept that some of these before and after photos should be included as figures in the manuscript.

More detail on remediation in Abstract:

The authors agree with this comment and will provide more specific information regarding the erosion controls used as part of the remediation process in the abstract of the manuscript.

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In the abstract mention of feasibility, cost of remediation, and suitability for this remediation to be used in other study areas should be included:

The Referee makes some good points regarding the logistical considerations of landscape scale gully remediation. The authors accept that these features should be briefly described throughout the manuscript to provide context. However, these features should not be treated as key components for meeting the objective of the study, which is to evaluate the effectiveness of remediation on gully water quality using novel monitoring techniques.

Mention cost of remediation in Abstract:

The authors agree that description of the cost of remediation will provide context regarding the importance of the remediation activities completed and the need to monitor their effectiveness.

Unclear description of gullies in Methods (Lines 95-115): The Referee comments on a section of text in the methods that describes the physical/geomorphological features of the gullies used as part of the study. The authors accept that this section of the paragraph can be improved, however, we believe that its location in the Study site section of the Methods section is appropriate. The authors will revise the text to provide a clearer description of features and estimated erosion rates of the gullies used for the study.

Specific Comment 2. “One really important issue is about literature review and other reclamation examples. In your case, your literature is mainly focused in studies carried out related to the GBR. However, there are other worldwide examples that could be included in the introduction and discussion section to discuss about remediation works. Some examples of remediation can be found in other areas as the Draix catchments (Rey et al. Burylo et al., 2014; Breton et al., 2016) or in Spain (Ballesteros et al. 2017; Oleagordia Montaña et al. 2016). I think that this information could be included and discussed about the feasibility of remediation works in gully and badland areas.”

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RESPONSE: Acknowledge.

The authors acknowledge that the literature review may focus too much on studies completed in catchments of the Great Barrier Reef and will include discussion on relevant remediation works completed elsewhere to provide a more global context to the study. The authors thank the referee for the suggested examples and will consider them when revising the literature review.

Specific Comment 3. “Other important issue is about the methodology to check the effectiveness of remediation works. You have been mainly focused in this work in turbidity measures, water samples: but what about UAVs information? Maybe it could be also interesting to use other kind of instrumentation that can provide different data to complete the dataset. Which are the topographic changes that have been observed in the area?”

RESPONSE: Acknowledge.

The authors acknowledge that remote sensing methods used to estimate erosion (i.e., airborne Lidar) could provide a useful complimentary line of evidence for the study. The authors provide discussion points and relevant data derived from terrestrial and airborne Lidar measurements throughout the manuscript. However, the authors did not extensively compare the results of the two methods in more detail as this would make the manuscript less concise and is not related to the overall aim of the study (i.e. water quality aspects of gully remediation).

Specific Comment 4. “I consider that an initial research hypothesis should be included together with the objectives and research questions at the end of the introduction section. - You should specify all the abbreviations and that you have used in the text, in figure and table captions (for example table 1) - In my opinion the title is too long.”

RESPONSE: Acknowledge.

The aim of the study is described in the final paragraph of the Introduction (Lines

76-78). The authors will revise this text to make the research questions and objectives clearer. The authors understand that there are many acronyms and abbreviations throughout the manuscript. However, we believe they are all specified when first mentioned in the text. The authors will consult with the Journal editor if an index of abbreviations and acronyms is appropriate for the manuscript. The authors will consider reducing the length of the title to make it more concise.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-268>, 2020.

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