



EGUsphere, author comment AC1
<https://doi.org/10.5194/egusphere-2022-604-AC1>, 2022
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Reply on RC1

Kirk B. Enu et al.

Author comment on "Review article: Potential of nature-based solutions to mitigate hydro-meteorological risks in sub-Saharan Africa" by Kirk B. Enu et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-604-AC1>, 2022

Authors: We would like to thank Referee #1 for their precious time in reviewing our manuscript. The insightful comments have helped to make key improvements to the manuscript. We carefully considered the comments and tried our best to address every one of them. Below, responses are provided to the specific comments and suggestions that were made.

Referee #1: Page 2 lines 17-26 - Before even the term NBS was born, other approaches for hydrometeorological risk reduction were adopted both without or in combination with conventional engineering measures. These were the so called soft engineering measures, which were more environmentally friendly. The authors should put more efforts in contextualizing the concept of NBS with prior similar terminologies, such as Ecological Engineering or Soil and Water Bioengineering, which have many aims and applications in common with NBS and recent studies have compared terms and definitions of these with NBS.

Authors: This comment is well noted. We have included a table (1) on concepts related to NBS such as low-impact development, green infrastructure, ecosystem-based adaptation, sustainable urban drainage systems and ecosystem-based disaster risk reduction in addition to Ecological Engineering and Soil and Water Bioengineering as suggested. This table also explains how these related concepts are linked to NBS and which regions they have been mostly used in. This is available on page 2 line 28-page 3 lines 1.

Referee #1: Page 3 line 1- typo, it should be "locals" instead of "locales"

Authors: Locales as used here is referring to a place, but we have replaced it with "local communities".

Referee #1: Page 3 line 8 - please remove the bold font for "protect, conserve"

Authors: This is well noted and has been addressed accordingly.

Referee #1: Page 4 line 19 - other sister projects of the H2020 projects mentioned should be also nominates (e.g. Operandum, Reconnect etc)

Authors: This is well noted and other recent EU H2020 projects like OPERANDUM,

Reconnect, ThinkNature and CLEARING HOUSE have been acknowledged as well. We have also indicated that as of September 2021; 32 projects had been funded under the initiative across 59 countries.

Referee #1: Page 5 line 1 - maybe I was distracted but I think that the first time I see that we are talking about "urban" NBS is here. Please mention that you are talking about urban areas also in the introduction. And also, if urban NBS is the focus, why is not present in the selection criteria shown in Figure 1?

Authors: The first sentence of the Introduction set the context of the study to be urban areas and on page 3 line 28, it was reiterated. We have, however, elaborated the reason for focusing on urban reasons, being engines of growth, having high population densities and the fact that SSA is undergoing rapid urbanization in the revised manuscript. This is available on page 4 lines 29-32 and page 5 lines 1-3.

Referee #1: Table 1: I think that here again Ecological Engineering or Soil and Water bioengineering, as well as urban forestry should be mentioned.

Authors: Thank you for this suggestion. Table 1 contains the terms that were used, in different combinations, for the literature search process. Urban forests were included but ecological engineering and soil and water bioengineering were not. This is because the selection of our search terms was informed by the examination of other papers on NBS, including the three below:

Ruangpan, L., Vojinovic, Z., Di Sabatino, S., Leo, L. S., Capobianco, V., Oen, A. M., ... & Lopez-Gunn, E. (2020). Nature-based solutions for hydro-meteorological risk reduction: A state-of-the-art review of the research area. *Natural Hazards and Earth System Sciences*, 20(1), 243-270.

Du Toit, M. J., Cilliers, S. S., Dallimer, M., Goddard, M., Guenat, S., & Cornelius, S. F. (2018). Urban green infrastructure and ecosystem services in sub-Saharan Africa. *Landscape and Urban Planning*, 180, 249-261.

Thorn, J. P. R., Aleu, R. B., Wijesinghe, A., Mdongwe, M., Marchant, R. A., & Shackleton, S. (2021). Mainstreaming nature-based solutions for climate resilient infrastructure in peri-urban sub-Saharan Africa. *Landscape and Urban Planning*, 216, 104235.

We did not include ecological engineering and soil and water bioengineering in our search terms since we did not find them in these papers.

We also examined the literature for NBS typologies (e.g., Somarakis, G., Stagakis, S., Chrysoulakis, N., Mesimäki, M., & Lehvävirta, S. (2019). ThinkNature nature-based solutions handbook) but did not find ecological engineering and soil and water bioengineering, which is why we did not include these terms.

This has been clarified in the revised manuscript as well and is available on page 8 lines 2-4.

Referee #1: Paragraph 2.5. Study Limitation - The authors have checked also possible projects implemented by humanitarian associations or Engineers without borders, who might have worked in these countries in the past with works related to Soil and Water Bioengineering,

Authors: We appreciate the suggestion. We searched the websites of 12 key institutions and 11 NBS databases where the majority of NBS projects in SSA are reported. Even so, we acknowledge that our search may not be exhaustive which is why we note the

dependence on reported NBS as a study limitation.

Referee #1: Figure 2 - this figure would be more complete, if you can add also the location of the cities where you found NBS are implemented, being this a review on urban NBS

Authors: Thank you for this suggestion. We had included the NBS locations in Figure 2 initially but later decided to leave them out as they were already indicated in Figure 5. We have included the specific city locations into Figure 2 with small yellow markers in the revised manuscript.

Referee #1: Page 10 lines 6-9 - you found 45 papers but how many NBS? this is not specified.

Authors: We indicated the number of NBS we identified, which were 66 in all. These were detailed on Pages 16 lines 4-12 and in Table 2 (Table 3 in revised manuscript).

Referee #1: Figure 5 - Maybe try to make the markers smaller.

Authors: This is well noted and has been addressed accordingly.

Referee #1: Table 2 - you have classified the NBS in three types: blue, green and hybrid approaches. Can you please explain how you have grouped them and on what is based your classification?

Authors: The classification of the NBS into green, blue and hybrid was explained in the Introduction on Page 3, lines 18-27 (page 4 lines 19-28 in the revised manuscript). Also in the revised manuscript, this has been included in bracket in the title of Table 3.

Referee #1: Figure 7 Please specify the numbers after each term, where they come from?

Authors: These numbers were generated automatically along the sankey diagram (in <https://sankeymatic.com>) based on the number of reported ecosystem services but are not relevant for understanding the figure. Many thanks for this comment. The numbers have been masked.

Referee #1: Page 24 lines 20-21- can you please explain how these species created opportunities to upscale livelihood benefits?

Authors: This comment has been addressed accordingly. Many thanks for pointing it out. It has been explained that these species are useful, for instance, for medicinal purposes, in the revised manuscript. The *Chromolaena odorata* can be used to treat skin ailments, the *Melia azederach* for controlling diabetes and gastrointestinal disorders and the *Eucalyptus* as an antioxidants and insect repellent.

Referee #1: Table 3 - maybe you can optimize this table and keep only one column with the country, so it's easier to make comparisons.

Authors: This comment is well noted and only the first two columns have been kept.

Referee #1: Page 29 lines 16-17 - This last sentence is not clear to me. Can you please explain this concept further?

Authors: While several examples of conventional engineering solutions, as used in this study, were given in the manuscript, we acknowledge that they were not explicitly defined. As such, a definition has been provided in the revised manuscript (page 2 lines

17-19) that conventional engineering solutions refer to grey infrastructure solutions that often have no or very minimal room for nature and are rarely multi-functional.