

Reply to Review #2 on “Hess Opinions: Socio-economic and ecological trade-offs of flood management – benefits of a transdisciplinary approach” by Karl Auerswald et al.

We appreciate the encouraging comments and helpful amendments. In blue we explain how we considered the reviewer’s advice in our manuscript.

Anonymous Referee #2

This is a timely paper that provides excellent insight into the complexities of floodplain use, flood management, the unintended consequences of engineering solutions to flood protection and management. In this regard, the overview of socio-economic and, ecological consequences within and beyond the river provided in Figure 1 was particularly useful. The examples used in the paper also provided good insights, and although these are derived from Europe and North America, they are of global relevance (e.g., the importance of side arms and channels within a floodplain as refugia for aquatic biota in the case of catastrophic events, pg 9).

It is, however, important to note that the impacts of human alteration of river and floodplain form and functioning is not unique to the northern hemisphere, from where most of the examples are derived. In many developing and emerging economies in the Global south, populations are concentrated in floodplain areas as these provide important livelihoods opportunities. This increases their vulnerability and “killer floods,” mostly affect developing countries (Kundzewicz et al. 2013). As economies develop, and the capability for implementing improved flood mitigation improves, the insights and recommendations from Auerswald et al. are relevant not only for conceptualizing proactive mitigation strategies, but also for developing appropriate policy interventions. If they wish, the authors might want to draw on some of the “management rather than control” (pg 11) approaches that are applied in regions where the construction of infrastructure (e.g., levees) is less well established (see Brackenridge et al., 2017). This is especially important for emerging economies where human habitation and associated pressures on floodplain ecosystems are likely to drive investment in quick fix, technological solutions.

Brackenridge et al., 2017. Design with nature: Causation and avoidance of catastrophic flooding, Myanmar, *Earth-Science Reviews* 165: 81-109, <https://doi.org/10.1016/j.earscirev.2016.12.009>.

Kundzewicz, Z.W., et al., 2013. Flood risk and climate change: global and regional perspectives. *Hydrological Sciences Journal*, 59 (1), 1–28.

We added:

“Even though most of our examples were derived from Europe and North America, where the development started and has proceeded farthest, human alteration of river and floodplain functioning is not restricted to the Northern Hemisphere. Similar developments can be observed in other regions such as tropical Asia, Africa or South America where mistakes made in the West are often repeated (Winemiller et al., 2016; Brackenridge et al., 2017; Latrubesse et al., 2017). This development tends to disregard the fact that, especially in the developing and emerging economies of the global south, populations are concentrated in floodplain areas; these floodplains provide important livelihood opportunities but also create large vulnerability to “killer floods” (Kundzewicz et al., 2013). Traditional communities and their economies in the Amazon are well-adapted to flood events, and demonstrate how floods can be incorporated in the daily life of densely populated countries and modern economies (Junk et al., 2011).”

Minor text edit suggestions.

Pg 9, 10, Revise end of sentence: On the other hand, if contamination of the river system occurs as in the deadly chemical spill of the River Rhine in 1986 during a fire at a Sandoz warehouse, side arms and channels within a floodplain can act as important refugia for aquatic biota and facilitate faster subsequent recolonization

We changed the sentence as proposed

Pg 9, 24, red deer is a specific example – I am not sure if a species name is required here,

Species name was added