Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2018-336-RC2, 2019

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Flood Risk in a Range of Spatial Perspectives – from Global to Local" *by* Zbigniew W. Kundzewicz et al.

Anonymous Referee #2

Received and published: 1 March 2019

I have really enjoyed reviewing this manuscript, which examines flood risk from global to local perspectives. The topic is very relevant, and such a paper is timely. Yet, I think that there are four key aspects that have been neglected (or not sufficiently well discussed). This manuscript would highly benefit from including a critical discussion around the following four major points (A-D).

A) Line 44-53.

This paragraph requires references, as some of these statements are in fact contested by many scholars. Flood trends reported so far are not so strong. For example, in their Science paper, Blöschl et al. (1) states that: "Will a warming climate affect river floods? The prevailing sentiment is yes, but a consistent signal in flood magnitudes has not been found." "A warming climate is expected to have an impact on the magnitude

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and timing of river floods; however, no consistent large-scale climate change signal in observed flood magnitudes has been identified so far." "Existing studies have been unable to identify a consistent climate change signal in flood magnitudes." Blöschl et al. (1) mainly refer to floods in Europe, but similar outcomes where found in other places around the world, such as Africa (2).

B) Line 111.

"Increased vulnerability" is listed as a factor for increasing flood risk. It is important to say that in fact at the vulnerability is in fact decreasing at the global scale, as shown for example on the PNAS paper by Jongman et al. (3). At the local scale, there are indeed instances in which vulnerability is increasing, but many authors have shown several examples of decreasing vulnerability (e.g. 4-7 among many others). I am aware that good news and promising trends sell less than bad news and catastrophic trends, but I think these outcomes should still be recognized in a scientific paper. See also my point D below.

C) Lines 263-268 (and following Section 5).

Previous sections have discussed that flood risk is increasing because more and more people live in flood-prone areas. This is a globally accepted fact. However, in this section the authors suggest increasing protection levels and having even more dykes or levees, which have been shown to attract even more people in flood-prone areas!! There is more than abundant literature on safe-development paradox, residual risk and levee effects (e.g. 8-11 to cite only a few) since the work of Gilbert White in the 1940s (8). Numerous scholars have showed that the introduction or reinforcement of structural protection measures are often associated with negative effects, such as: Increasing exposure to flooding. As protected flood-prone areas are perceived as safer, they attract more assets and people (9). Increasing vulnerability to flooding. As protected flood-prone areas are perceived as safer, people living in these areas have less incentives to take individual precautionary measures (10) Social injustice. Structural

measures protecting same areas from frequent flooding, alter the spatial distribution of risk in a way that can affect social groups that are less privileged (11). Preventing relocation. People is highly protected areas are less willing to relocate from risky areas (12). Losses of biodiversity. Levees and dikes that prevent the natural inundation of floodplain also negatively affect biodiversity and ecological functions (13).

D) Lines 352-358.

This paragraph, which deals with social learning, is too shallow. “It is assumed. . .” not clear by whom, and in which context. There is abundant literature in this topic, which deserves a better treatment. Instead, a specific example is provided (2011 flood in Thailand) to hint that such a learning is not really happening. In fact, there are many case studies showing learning effects or that the negative impact of an extreme event tends to be lower if such an event occurs shortly after a similar one (e.g. 3-7 among many others): Decreasing flood fatalities have been observed in Bangladesh over the past decades (4). The economic losses of the 1995 Meuse River flooding in Central Europe were remarkably lower than those in 1993, even though the magnitudes of the two events were similar (5). Di Baldassarre et al. (6) show adaptation effects in study areas around the world. Kreibich et al. (7) show multiple examples of learning dynamics in several test sites. Vulnerability to river flooding has been declining over the past decades (3), as a result of adapting response at the local scale.

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