Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2018-333-SC1, 2018

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Hess Opinions: An interdisciplinary research agenda to explore the unintended consequences of structural flood protection" *by* Giuliano Di Baldassarre et al.

V. Moya Quiroga

vladyman@hotmail.co.uk

Received and published: 30 August 2018

The authors discuss a very interesting topic (the unintended consequences of structural flood measures) and propose a good agenda. I consider it especially important because few weeks ago social media were flooded with comments praising the Tokyo underground flood tunnels, despite some Japanese researchers note that such ultra expensive infrastructure may lead to a false sense of security. Moreover, Matsuda (2013) suggests that the vicious cycle (large investment -> sense of security -> concentration of property and people -> increased potential for damage -> large investment -> . . .) has been one of the great problems/challenges of Tokyo since the 19th century.

The proposed agenda is a very interesting and important topic. Nevertheless, I believe the current agenda has some limitations. Thus, I would like to suggest some points that may be included:

In 4.1 Comparative analysis:

Future conditions. I would like to stress the importance simulate the effects (hazards) of future conditions. Regardless the changes in vulnerability, exposure or resilience, the hydrological drivers and the hydrodynamic conditions of future flood events will be different. It would be useless to analyze future vulnerability changes without considering future conditions and future hazards. Climate change and economic growth are key factor that will alter the hydrological response of catchments. For instance, Moya Quiroga et al., (2016) suggests that future hydrological design discharges may increase up to 15% due to climate change, while Winsemius et al., (2015) suggests that flood contribution by climate change may be small compared with economic growth.

Worldwide case studies. Most of the potential case studies are from Europe (only one case from America). European basins are small ones, especially when compared with basins from South America (SA) or South East Asia (SEA) (smaller size, smaller peak flows, hydrographs and less sediments). Besides, as SA and SEA basin are on tropical locations, they are more sensitive to future changes. Thus, it would be important to include more world case studies.

Additional infrastructure. The presented agenda focuses on levees. It would be important to analyze additional infrastructure such as dams or roads. Although the objective of such infrastructure (roads, dams) is not flood protection, they are designed based on given hydrological condition that will be changed and have not been analyzed. Moreover, the upstream effects of protection infrastructure has not been analyzed.

Upstream consequences. Upstream consequences of dams and levees have always been neglected. Only recently new studies analyzed some upstream consequences of dams. For instance,, new studies revealed that Three Gorges Dam would induce more frequent impounding periods with higher risks of risks of infection and illness stopping transport of pollutants, higher pollution in upstream tributaries (Sha et al., 2015; XIao et al., 2013) and more.

In 4.3 Exploitation of new methods, concepts and data

Currently there is lack of knowledge regarding the cascade effects. Flood structural protection measures are designed to keep and store the water on the upstream. Such ponded water usually becomes a breeding pool for several infections and diseases. For instance, ponded water in floodplains and reservoirs usually becomes a breeding pool for mosquitoes; hence, are likely to increase the transmission of vector borne diseases like malaria (Endo and Eltahir, 2018; Moya Quiroga et al., 2018).

References

Endo, N. Eltahir, E. 2018. Modelling and observing the role of wind in Anopheles population dynamics around a reservoir, Malaria journal,

Xiao, G., Qiu, Z., Qi, J., et al., 2013. Occurrence and potential health risk of Cryptosporidium and Giardia in the Three Gorges Reservoir, China, Water Research, 47 (7), 2431-2445.

Sha, Y., Wei, Y., Li, W., et al., 2015. Artificial tide generation and its effects on the water environment in the backwater of Three Gorges Reservoir, Journal of hydrology, 528, 230-237.

Matsuda, I. 2013. Verifying Vulnerability to Natural Disasters in Tokyo, Journal of Geography, 122 (6), 1070-1087

Moya Quiroga, V., Kure, S., Udo, K., Mano, A. 2018. Analysis of exposure to vector borne diseases due to flood duration for a more complete flood hazard assessment: Llanos de Moxos - Bolivia, Revista Iberoamericana del Agua RIBAGUA, 5(1), 48-62. DOI 23863781.2017.1332816.

Moya Quiroga, V., Kure, S., Udo, K., Mano, A. 2016. Changes in the hydrological design discharges due to Climate Change: Bolivian Amazonia, Journal of Environmental Systems and Engineering, Japan Society of Civil Engineers Series G (JSCE-G), 72(5), I247-I252. http://doi.org/10.2208/jscejer.72.I_247

Winsemius, H., Aerts, J., van Beek. L., et al. 2015. Global drivers of future river flood risk, Nature Climate Change, 6(4), 1-5.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-333, 2018.