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The ABC of Hazard Cascades Governance

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Recent natural and technological hazard cascades, such as the 2004 Sumatra-Andaman earthquake and tsunami, the 2011 Tohoku earthquake, tsunami and nuclear catastrophe and the 2013 Super Typhoon Haiyan, showed the need for new approaches that take into account hazard cascades. Those include chains of hazardous events and increasing vulnerability, among other types of correlations within the risk process. The recently developed methods for hazard and risk cascades assessment integrate interactions between different risks by using harmonized procedures based on common metrics. While the products of these assessments, such as multi-hazard and -risk indexes, maps, cascade scenarios, or warning systems provide innovative and effective information, they also pose specific challenges to policy makers and practitioners. This contribution addresses the social, institutional and governance dimension of hazard cascades. More precisely it presents the results of: i) an analysis of institutional barriers, ii) an educational exercise aimed at improving the level of public knowledge about hazard cascades. The results of this contribution are based on interviews/focus groups conducted in Italy and Guadeloupe, workshops with over 70 disaster risk reduction practitioners from eleven European countries, and an educational exercise with 38 European high school teachers. The results show the need for a clear identification of responsibilities for the management of hazard cascades, as institutional frameworks for risk reduction remain until nowadays primarily single-risk centred. Authorities are rarely officially responsible for the management of cascade effects between e.g. tsunamis and industrial accidents, earthquake and landslides, floods and electricity network failures. Other barriers for the implementation of these approaches include the limited measures to reduce exposure at the household level, inadequate financial capacities at the local level and limited public-private partnerships, especially in case of interactions between natural and industrial risks. Lack of public knowledge and awareness of hazard cascades is also a major problem. To address it, we developed an educational exercise using an Hazard Correlation Matrix (HCM) to foster critical thinking. The HCM qualitatively describes possible interactions between 16 different natural, technological and socio-economic hazards. The results show that most participants were able to describe cascading phenomena within the HCM by reducing them into sets of one-to-one interactions. Moreover, based on their experience and imagination, they foresaw additional interactions that were not discussed, never observed but are scientifically plausible. The majority of the participants reported that the exercise increased their level of awareness and knowledge about cascading hazards. The HCM was observed to be especially effective in translating complex hazard scenarios into basic interactions and vice versa. In the future, it can be used as basis for transformative learning in the education of the public on the role of cascading hazards in major catastrophes. Moreover future research should aim at testing the HCM also with risk managers and practitioners. In order to enhance their awareness, knowledge and agency with respect to hazard cascades, we also propose a governance framework, which includes the phases of observation, social and institutional context analysis, generation of knowledge and stakeholder engagement processes.