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The role of vulnerability for Early Warning Systems effectiveness

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According to some authors, Early Warning Systems (EWSs) performance should be assessed in term of their capacity to reduce expected damages (i.e. risk). From this perspective, the evaluation of the maximum loss, in case a hazardous event occurs, as well as the estimation of its reduction, because of mitigation actions people implement after a warning is issued, represent two critical issues in the evaluation of EWSs.
Vulnerability is a key factor for EWSs performance as well, affecting both the maximum loss (by means of all those features that make a community more or less prone to be damaged) and its potential reduction (by means of people capacity to properly react to the warning). Moreover, during a warning, mitigation actions are mainly addressed to reduce vulnerability (note that, herein, vulnerability is intended as including exposure as well), given that, once a hazardous event is going to occur, its features can be only partially reduced (i.e. by placing gates or elevating dikes), above all, when lead time is short. On the opposite, a variety of actions can be implemented to reduce vulnerability (from moving assets to informing people and preparing for the emergency) also when available time is limited.
In line with this, vulnerability must be carefully assessed in any EWSs evaluation as its knowledge is fundamental not only in the design of the system but also for its implementation (i.e. to manage the emergency). In other words, vulnerability is the component of risk that plays a major role for EWSs performance.

This presentation describes the damage assessment that has been carried out for the evaluation of the Flood Early Warning System (FEWS) that is currently implemented in the town of Sondrio (in the Italian Alpine region) as well as the estimation of the potential damage reduction achievable for the city, just because the FEWS is in place. The discussion focuses, in detail, on the role of vulnerability in shaping damage and its reduction, on vulnerability multifaceted nature (from physical to social and organisational) as well as on how it has been included/modelled in the analysis. From the latter perspective, a modelling approach is introduced too which combines social science with engineering approaches to the problem of flood warning effectiveness.