

Quantifying and assessing the lesser discussed dimensions of vulnerability using fuzzy multi criteria decision making: A step towards building resilience in India

Repaul Kanji (1), Rajat Agrawal (2), Sonam Sahu (3), Ankur Srivastava (4), and Abhishek Kumar (5)

(1) Centre of Excellence in Disaster Mitigation and Management, Indian Institute of Technology Roorkee, Roorkee, India, repaul23@gmail.com, (2) Department of Management Studies, Indian Institute of Technology Roorkee, Roorkee, India, dr.rajat07@gmail.com, (3) Graduate School of Global Environmental Studies, Kyoto University, Kyoto, Japan, ar.snmsahu@gmail.com, (4) Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, Delhi, India, ankur.srivastava7@gmail.com, (5) District Disaster Management Authority (UNDP India), Mandi, India, abhiin001@gmail.com

Resilience can only be built when vulnerabilities of not only the country, at large, but also of the community, society and individuals are understood, assessed and quantified. There are very few programs in the world that deal with the lesser discussed dimensions of vulnerability. However, their reports on India does a very little to finger-point the vulnerabilities and their basic causes and consequentially it becomes rather difficult to cope with the same. Hence, it is important to quantify a community's (or the smallest administrative unit's) vulnerability to a particular hazard, on a local level. The study focuses on turning general guidelines of national authorities and institutes of disaster management for specific hazards and other relevant notions into different criteria. Responses of a community's and different concerned institutes' knowledge, awareness and sensitivity about these criteria are recorded and modelled using fuzzy numbers. The responses are then used as an input to a pathway based on multi criteria decision making to quantify the vulnerability of that particular community to a specific hazard. The use of fuzzy logic takes care of human ambiguity in responses and the involvement of the people of the targeted community as well as practitioners and academicians in the statistical process of determination eliminates subjectivity of the result. The novelty of the work lies in the fact that this pathway involves all the stakeholders and thereby presents a better picture of vulnerability and in doing so points out the exact avenues which contributes to vulnerability and should be worked upon to increase the coping capacity. The intention of the research group is to carry out this exercise in the smallest administrative units (blocks) and thereby moving on to larger ones (district and states), putting forth a clear illustration of the vulnerabilities specific to a disaster and the causes behind it. The outcome of such an exercise has also been discussed in this research which clearly highlights the advantages of the proposed pathway over other existing methodologies.