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A country-specific Geo-Risk Index (GRI); a first approximation to partitioning the contribution of hazard and vulnerability

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Risk from geohazards (including landslides, floods, earthquakes, volcanoes) are broadly thought of as being some function of hazard and vulnerability. To date, qualitative attempts have been made to make global maps of a range of hazards as well as for individual hazards. Vulnerability has also been mapped at regional and global scales using a variety of approaches, including the mapping of various socio-economic indexes developed by the World Bank and other agencies. In addition, comprehensive global listings of actual major geohazard events are now generally accessible. Whilst these contributions have been useful to illustrate global patterns in hazard, vulnerability, and actual geohazard occurrences, a robust country- specific Geo-Risk Index has not been developed. Further, recent attempts to devise such a measure appear to a) incorporate actual geohazard occurrences into a country specific measure, and b) include vulnerability elements in the representation of hazard, thus blurring the contribution of hazard and vulnerability to geo-risk. In this paper we attempt to develop a score-based country-specific Geo-Risk Index (GRI) that combines some measure of hazard (Geophysical Hazard Index - GHI) and some measure of vulnerability (Geophysical Vulnerability Index - GVI), independent of actual geohazard occurrences. We map out the score in hazard-vulnerability space and rank the countries of the world in terms of geo-risk exposure. Although calibration of the index against actual natural disaster events remains to be carried out, our data suggests that the countries with greatest geo-risk are apparently exposed because of overwhelming hazard levels that exist in the country's natural environment and that vulnerability is a secondary contributor. This conclusion is in contrast to recent arguments that vulnerability is the key characteristic conditioning a country's geo-risk exposure.