Global patterns of Interactions between Invasive Species and Natural Hazards

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Invasive alien species (IAS) and natural hazards have a broad range of environmental and socio-economic impacts. IAS can change the physical environment thus influencing the probability of natural hazards and likewise, natural hazards can facilitate or impede species invasion. In this paper we: (i) systematically map the state of evidence on interactions between IAS and natural hazards; (ii) identify areas susceptible to the interaction of species invasions and natural hazards, and (iii) identify research priority areas in IAS-Natural Hazard interactions, focussing on those regions susceptible to species invasions and natural hazards but where there is current lack of research. To better understand the interaction of IAS and natural hazards, we use as evidence the published literature using a systematic mapping approach in Web of Science. Indicators of invasive species exposure potential and natural hazards exposure potential were adapted from the literature, combined and classified using k-means clustering. Overall, 845 sources of published literature were used as evidence in our database. The number of articles focusing on the influence of natural hazards on IAS (599 [71%] of 845 sources) was greater than the number of articles focusing on the influence of IAS on natural hazards (155 [18%] of 845) and 91[11%] of 845 sources discussed both the influence of IAS on natural hazards and the influence of natural hazards on IAS. For each source we documented increased probability, decreased probability, and no change relationships. In terms of the natural hazard focussed on, the most frequent (399 [47%] of 845 sources) in the literature base focused on wildfires. In terms of type of invasive species, the most frequent (683 [81%] of 845 sources) studied plants. With respect to geographic focus, the most frequent (406 [48%] of 845 sources) were conducted in the USA. Areas identified as highly susceptible to both IAS and NH, and therefore with greater chance of interaction effects occurring, are N America and Australasia followed by Europe, Central and S America, S and SE Asia.S and SE Asia, Central Africa and northern S America in particular were identified as regions that are highly susceptible to IAS and NH but lack research, and are priority areas for future research on interactions. Such efforts would be important for reducing exposure to NH and the impacts of IAS.