

Appendix 1: Literature and institutional review search terms and statistical methods

METHODS

Education and training institutional review

To evaluate the prevalence of disaster-related training in the field of ecology, we reviewed the number of topical workshops, symposia, and special sessions offered over the past 20 years during the annual conferences of nine topical societies: the American Fisheries Society (AFS), the Association for the Sciences of Limnology and Oceanography (ASLO), the Association of Tropical Biology & Conservation (ATBC), the Botanical Society of America (BSA), the British Ecological Society (BES), the Coastal and Estuarine Research Federation (CERF), the Ecological Society of America (ESA), and the International Biogeography Society (IBS). No meeting programs were available for the year 2000 for any conference. The search terms “disaster”, “hurricane”, “typhoon”, “earthquake”, “landslide”, “eruption”, “tsunami”, and “spill*” were used to find and validate hits on relevant education opportunities for ecologists. If a title received a hit, the event was counted and the abstract, if available, was searched for relevance. If an abstract received a hit, the title was reviewed and counted only if the event was relevant. Canceled events were excluded from consideration.

To explore extant practices in training and education related to disaster response and community engaged ecological research, we used the Leiden Ranking (LR) to identify the top 500 universities worldwide based on bibliometric indicators such as publication output, citation impact, and scientific collaboration. The LR was chosen for its transparency and recognition of limitations. We randomized the list of universities so that we could get an unbiased subset for our analysis (i.e., not only taking the top universities from each continent). Thereafter, the first twenty universities from Europe, Asia, Africa, Oceania, and the Americas respectively were identified from the randomized list (based on the randomized numerical order, not rank), thereby allowing a balanced and random list of 120 universities for the analyses. Each university website was mined to gather information on whether the university offers courses related to disasters, and if so, how many courses are offered, the level at which such courses are offered (graduate or undergraduate), within which departments they are offered, the location of the university and whether it is a private or public institution. This information was used to examine i) how common it is to have courses relating to disasters in higher education, and ii) at what academic level, ii) which departments provide such courses, ii) and if there were any trends based on the risk of each country to disaster. To quantify “risk to disaster”, we used the World Risk Index, which is a percentage metric that measures each country’s risk to natural disasters based on 28 indicators and globally accessible data.

Literature review: funding and engagement

We performed a systematic literature review coupled with a bibliometric analysis to identify disaster-related ecological studies and funding sources thereof. We performed an Advanced Topic Search through Web of Science (WoS) in July 2020 using keywords for high impact disasters (“disaster”, “earthquake*”, “hurricane*”, “typhoon*”, “landslide*”, “eruption*”, “spill*”, and “tsunami*”) and in the WoS Category “Ecology”. We selected these keywords

because each is highly identifiable through the scientific literature over time, while terms such as “wildfire” and “flood” that often focus on purely disturbance ecology perspectives were not used for searches. We limited our search to studies published in the last 20 years (2000-2019), that were written in English, and that were classified within the category “Ecology” as defined by WoS. This search yielded a total of 2,481 studies, including 1,320 (53.2%) articles reporting standardized information regarding funding sources. Information on these entities was manually standardized given the disparity of names used to refer to the same institutions. Based on this information, we classified all reported funding entities depending on type of resource (public, non-profit, university, private, or intergovernmental), level of administration (international, national, or regional) and mission (fundamental or missional).

To further characterize institutional practices in funding disaster ecology research, we gathered funding data made available through the NSF awards database (<https://nsf.gov/awardsearch/advancedSearch.jsp>). We retrieved records of all the RAPID (Rapid Response Research), SGER (Small Grants for Exploratory Research), and EAGER (Early-Concept for Exploratory Research) grants awarded between 2000 and 2019. We classified a project as disaster-related if the title or abstract contained one or more of the following keywords: “disaster”, “earthquake”, “eruption”, “hurricane”, “typhoon”, “tsunami”, “landslide”, “flood”, “tornado”, “fire”, “wildfire”, “spill”, “mudslide”. Disaster-ecology research was identified by including identifying those with abstracts having a combination of disaster-related keywords and ecology-related keywords (e.g., “ecolog”, “species”, “assemblage”). To investigate Katrina-related SGER funding, keywords “Katrina”, “Hurricane Katrina”, and “post-Katrina” were search for in either the title or abstract of awards.

To determine the prevalence of community engagement and community-engaged practices in disaster-related ecology research, we modified the aforementioned approach to include terms such as: engag*, “community-engaged framework”, “community engagement”, “community-engagement”, “community-engaged research”, “community-engaged scholarship”, “community engaged research”, “community-engaged participatory research”, “CER”, “CEnR”, and “CBPR” in the WoS defined “Ecology” category in articles published between 2000 and 2019. To compare ecology to other fields of study, we used the same search terms in the following WoS defined categories: “Public, Environmental, and Occupational Health”, “Economics”, and “Psychology”.

Statistical methods

We performed Spearman’s rank-order correlation analysis to assess the strength of associations between World Risk Indicator measures and the availability of disaster-related education opportunities at higher-education institutions, as well as university rank (according to Leiden Ranking) and the number of courses offered. One-way analysis of variance was used to determine how the estimated number of papers published using CER methodologies varied among disciplines, with post-hoc Tukey HSD tests for pairwise multiple comparisons between individual disciplines. Data pertaining to trends over time were examined first using Pearson’s correlation to determine possible associations, and then analyzed using general linear models to determine the magnitude and significance of change over time. We would like to note that our estimate of the minimum lag between reported award dates and project start dates is negative

because it accounts for projects that start early through pre-award funding. All data were analyzed in R version 4.0.2.