AN ANNOTATED BIBLIOGRAPHY OF

NATURAL HAZARD LOSS DATASETS

DERIVED FROM THE HAZARDS LOSS DATASET CATALOG

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Introduction

The Hazards Loss Dataset Catalog, initiated by the Natural Hazards Center and the Center for Science and Technology Policy Research at the University of Colorado at Boulder, is an effort to fill a gap in knowledge about hazards loss data. The understanding of hazard losses is very important for improving recovery decisions, monitoring mitigation efforts, assessing vulnerability, and determining disaster assistance. Despite the data's importance to society, there is a void in the research.

Agency collection methods associated with hazard losses are inconsistent with one another. Currently, there is neither one institution responsible for collecting hazard losses, nor a standardized collection method. Data are collected by many agencies for many reasons. The types of data collected are dependent on the given agency's mission, which leads to varying degrees of detail. This poses problems in analysis. The difference in collection methods can lead to unreliable data that can be misused by researchers or skew research results. Loss data that are currently available should be used with careful consideration of collection methodologies, inclusion criteria, and data adjustments.

The aim of the Hazards Loss Dataset Catalog is to collect information about existing hazard loss datasets into a searchable database, which will be made publically available, both as an electronic database and in this annotated bibliography. The project includes not only hazard loss datasets, but also relevant literature. More detailed information about fewer hazard loss datasets was collected to allow for a deeper understanding of each one.

Information about the collection and data entry methods provided here will enable the Hazards Loss Dataset Catalog to grow and evolve over time. Recording the process will allow future researchers to understand how the database was compiled.

Methodology

Criteria for Selection

The first criterion is hazard event type. Event types include avalanches, droughts, earthquakes, extreme temperatures, floods, fog, hail, hurricanes, landslides, lightning, severe storms, tornadoes, tsunamis, volcanoes, wildfires, wind storms, and winter storms. Once the first criterion is met, then the dataset must contain information about human fatalities or economic losses occuring as a result of a hazard event in North America. Economic losses consist of any financial loss to the overall economy, including property loss, crop loss, insured loss, or normalized loss.

Search Strategy

The search strategy used here is Internet-based, using search engines such as Google Scholar. A series of search terms were established to describe the research topic and its key concepts. Once the terms were created, they were used to generate alternative terms. Synonyms and acronyms helped to increase the volume of useful information found.

Terms used to locate records for the Hazards Loss Dataset Catalog were "disaster data," "loss databases," "hazard loss databases," "disaster damages," and "hazard loss estimation." In addition to the general terms, keywords for specific hazard types were also used.

Information was gathered using several online resources, including search engines, annotated bibliographies, and subject gateways/directories such as CBS News Disaster Links (**http://www.cbsnews.com/digitaldan/disaster/disasters.shtml**). Results were judged using the selection criteria to ensure the datasets met the needs of the project. If the criteria were met, the source was evaluated for credibility. Credibility was established by reviewing a resource's integrity and expertise. These qualities are subjective in nature, but can be evaluated based on objective elements including, institutional affiliations and availability of metadata. Every effort was made to include only datasets from reliable sources.

Building on existing resources was a key strategy. Most resources contained a bibliography or reference section, which led to many other useful reports, databases, and journal articles. Many resource Web sites had a "related links" page, which led to associated hazard datasets or institutions.

Data Entry Methods

Maintaining standardized entry methods is crucial for producing a credible database, although exact uniformity is not always feasible. Every effort has been made to ensure consistency in the data entry methods.

The Hazards Loss Dataset Catalog relies on the citation database software EndNote and EndNote Web to manage data entries and to generate bibliographies. The Web version was chosen for the project's data management tool because of its versatility. Data entered into EndNote Web can be shared with and accessed by multiple users simultaneously. The Web version is user friendly and groups resources. The groups can be renamed to correspond with data. Establishing distinctive group names helps minimize confusion by keeping similar entries together. Entries into the Hazards Loss Dataset Catalog were placed into one of three groups: loss database, related literature, or literature with data.

EndNote Web offers more than 40 forms containing different fields that correspond to different media types—known as reference types—to record citation information. Data entry begins with the selection of the appropriate reference type from the drop-down box. The most common reference types used in this project were online database, journal article, report, and Web page. Specific entry methods, by field, are:

Author: Resources authored by an individual, or a number of individuals, are entered using their last name, first name, and middle initial. Resources where an institution only is given as author are entered using the institution's name. If an institution has an accepted acronym, it is included in parentheses following the institution name.

Title: Titles are entered as they appear in the source data. Titles for all reference types (except journal articles) are capitalized using general title capitalization rules; the first letter of all major words in the title are capitalized, while little words, like a, an, the, etc., remain in lower case. In journal articles, only the first word and proper nouns are capitalized. If a colon is present in the article title, the first letter of the first word following the colon is capitalized.

Year: Contains the most current year associated with the resource, which represents when the data were last updated. If a resource does not indicate updates the publication year is used.

Publisher: Lists the institution responsible for publishing the resource. If there is an educational or institutional affiliation, its full name is included. Associated acronyms are not included.

Date published (if available): Many datasets include a publication year.

Abstract: Contains annotations about a given resource. Abstracts that already exist within a journal article or report may be used instead of a drafting a personal annotation. If the reference type is an online database, information such as data sources, dataset attributes, supplemental data, time periods covered, and number of entries in the dataset are included.

Label (if applicable): Used to document referring material in hopes of preserving a research trail. This includes a citation for any Web site, journal

article, or report leading directly to the relevant resource.

Keywords: A master list of keywords was established and maintained for this project (see Appendix). Keywords used are copied and pasted from the master list to ensure accuracy.

URL: Contains a URL that directly links to the resource.

Notes (if applicable): Used for information about criteria and data output. Many online databases have inclusion criteria for their datasets. If criteria information is available, it is entered following the heading CRITERIA (in all capital letters). A description of the data found within the dataset or piece of literature is entered following the heading DATA OUTPUT (in all capital letters).

Research Notes (if applicable): Contains information about materials related to the resource entered. The heading RELATED MATERIALS is entered, followed by a complete citation for a supplemental resource that correlates with the entry resource. This field may include user guides, evaluations, datasets, journal articles, or reports.

Conclusion

There is a wealth of hazards data available. The Hazards Loss Dataset Catalog identifies where existing hazard loss datasets are stored and describes the information contained within them. Expanding this catalog is recommended to provide a more comprehensive perspective on available loss data. In particular, extending the work to include international datasets will increase the catalog's value.

Because of time and labor limitations, only a small portion of available loss data is represented in the initial cataloging. While it is difficult to make strong assertions, this work confirms the assumption that there is little uniformity to collection methods, potentially limiting the use of data by researchers.

Annotated Bibliography

Loss Databases

Asian Disaster Reduction Center (ADRC). 2009. GLIDEnumber. Asian Disaster Reduction Center. Available from http://www.glidenumber.net/glide/public/search/search.jsp

The Global Identifier Number (GLIDE) project was proposed by the ASDR, and supported by many notable disaster institutions, to address issues in locating disaster data. A GLIDE number is a universal ID unique to a particular hazard event. The number is comprised of two letters identifying the disaster type, the year of the disaster, a six-digit sequential disaster number, and a three-letter ISO code to identify the country of occurrence. After the number is assigned to an event, it is included in all data documenting the disaster. This allows all data associated with a particular event to be linked to one number.

DATA OUTPUT: Date of occurrence, duration, location, magnitude, information source used, and event description (may include fatality and loss information, if available).

KEYWORDS: Avalanche, Drought, Earthquake, Extreme Temperature, Fatalities, Flood, Hurricane, Landslide, Severe Storm, Technological Hazard, Tornado, Tsunami, Volcano, Wildfire, Wind Storm

Center for Hazards Risk Research (CHRR). 2005. Hotspots. Center for Hazards and Risk Research, Columbia University. Available from http://www.ldeo.columbia.edu/chrr/research/hotspots/

The Hotspots project was initiated by the World Bank and Columbia University to identify "hotspot" areas where the risk of natural disaster is particularly high. The project assesses the risk of mortality and economic loss on a global grid. This allows for sub-national risk analysis by calculating risk for each grid cell instead of each country. The project developed three indices of disaster risk. The first is mortality risks assessed for the global, gridded population. The second is total economic loss risk, assessed for global, gridded gross domestic product (GDP)

per unit area. The third is risk of economic loss expressed as a proportion of the GDP per unit area for each grid cell. Earthquakes, volcanoes, landslides, floods, droughts, and cyclones are the six disaster types studied. The Hotspots Web page includes many useful resources including reports, maps, case studies, disaster profiles, and more.

DATA OUTPUT: Datasets are in GIS format and come in a ZIP file that includes an ASCII text file of the raster dataset (.asc), detailed metadata (.htm), projection information (.prj), and where available, a dBase table (.dbf). Data are available in four categories for each hazard type or multi-hazard. The categories are as follows: hazard frequency or distribution; hazard mortality risks and distribution; hazard total economic loss risk deciles; and hazard proportional economic loss risk deciles.

KEYWORDS: Drought, Earthquake, Economic Impact, Fatalities, Flood, Hurricane, Landslide, Volcano

Centre for Research on the Epidemiology of Disasters (CRED). 2008. EM-DAT: Emergency Events Database. Centre for Research on the Epidemiology of Disasters, Université Catholique de Louvain. Available from http://www.emdat.be/
EM-DAT is a country-level emergency events database maintained by the Centre for Research on the Epidemiology of Disasters (CRED) at the Université Catholique de Louvain in Brussels, Belgium. It contains essential data regarding the occurrence and effects of over 17,000 natural and technological disasters worldwide from 1900 to the present. Data are consolidated and updated daily, with further accuracy checks performed quarterly, and revisions made annually. Data are compiled from several sources, including United Nation agencies, nongovernmental organizations, insurance companies, news organizations, and research institutions.

CRITERIA (must meet one of the following): Ten or more reported fatalities, 100 people reportedly affected, declaration of a state of emergency, or call for international assistance.

OUTPUT DATA: Disaster number, country, disaster group, disaster type, date of occurrence, fatalities, injuries, displacement, total number of people affected, and estimated damage (thousands, in U.S. dollars).

KEYWORDS: Avalanche, Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Hail, Hurricane, Injuries, Landslide, Lightning, Severe Storm, Tornado, Tsunami, Volcano, Wildfire, Winter Storm, Technological Hazard

Dartmouth College. 2008. Global Active Archive of Large Flood Events. Dartmouth Flood Observatory, Dartmouth College. Available from http://www.dartmouth.edu/~floods/DataProducts/ExtremeFloods/index.html
The Global Active Archive of Large Flood Events is maintained by the Dartmouth Flood Observatory (DFO). The comprehensive database contains almost 3,500 entries of floods from 1985 to the present, with current floods added immediately. Data are retrieved from news, government, and remote sensing sources, as well as from national and international space agencies. The DFO Web site provides links to images from satellites or airborne sensors related to a particular flood event. Many of the images have been interpeted, and then mapped by DFO staff to show the extent of inundation in an area. Although maps are not available for all events, the Web site allows users to order GIS inundation vectors for personal use. Inundation is also shown in the "World Atlas of Flooded Lands" section of the Web site. The database is available for download in Excel format and includes locational polygon information for use with GIS software to identify areas affected in a given event.

DATA OUTPUT: GLIDE number, country, location and name of river flooded, area(s) affected, beginning/end dates, duration, number of displaced, number of deaths, damage (in U.S. dollars), cause of the flood, severity (based on a severity class), size of affected area, magnitude, and notes or comments about the event. Archive notes on the Web site provide definitions for components of the dataset.

KEYWORDS: Displacement, Economic impact, Fatalities, Flood

Green III, Walter G. 2006. The Disaster Database Project. Walter G. Green III, University of

Richmond. Available from http://learning.richmond.edu/disaster/index.cfm

The Disaster Database Project is an international database created and maintained by Dr. Walter Green III at the University of Richmond's School of Continuing Studies. The database has over 1,800 entries relating to natural disasters, conflict-based disasters, and human system failures. Data sources include newspapers, scholarly books, and government reports. The database uses a five-phase structure to help describe the nature of the event. The phases are as follows: Phase I—prodrome, Phase II—development, Phase III—impacts, Phase IV—response, and Phase V—recovery.

CRITERIA (must meet one of the following): Represented a threat to life, property, or the environment; required emergency procedures to limit and resolve impact; caused a jurisdiction, agency, or organization to declare an emergency situation or mobilize resources in response; or the presence of a significant degree of community or organizational impact.

DATA OUTPUT: Location, date, time, event class, type, intensity, fatalities, injuries, and phase descriptions.

KEYWORDS: Avalanche, Drought, Earthquake, Extreme Temperature, Fatalities, Flood, Hail, Injuries, Landslide, Severe Storm, Terrorism, Tornado, Tsunami, Volcano, Wildfire, Wind Storm, Winter Storm

(*Note: See related entry on page 13)*

Hazards and Vulnerability Research Institute (HVRI). 2008. The Spatial Hazard Events and Losses Database for the United States (SHELDUS), Version 6.2. Hazards and Vulnerability Research Institute, University of South Carolina. Available from http://webra.cas.sc.edu/hvri/products/sheldus.aspx

SHELDUS is a publicly accessible, county-level dataset of natural disasters occurring in the United States (excluding U.S. territories). The dataset includes 400,000 entries and examines 18 disaster types that occured from January 1960-December 2007. SHELDUS provides maps of event locations, as well as detailed georeferencing information. Sources of data include National Climatic Data Center Storm Data, the National Geophysical Data Center Tsunami Event database, the Storm Prediction Center, and several other existing national data sources.

CRITERIA (must meet one of the following): For events occurring between 1960 and 1995, a loss threshold of $50,000 or more in property or crop losses was used. After 1995, SHELDUS includes all events that are reported with a specific dollar amount in National Climatic Data Center Storm Data. The change in methodology is attributed to a 1995 change in reporting procedures at the National Climatic Data Center.

OUTPUT DATA: Date, event type, location (with FIPS codes for spatial information), number of fatalities/injuries, property damage, and crop damage cost estimates.

KEYWORDS: Avalanche, Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Fog, Hail, Hurricane, Injuries, Landslide, Lightning, Presidential Disaster Declaration, Severe Storm, Tornado, Tsunami, Volcano, Wildfire, Wind storm, Winter Storm

Munich Re. 2009. NatCat SERVICE. Munich Re. Available from http://www.munichre.com/en/ts/geo_risks/natcatservice/default.aspx

NatCat SERVICE is an private international database maintained by Munich Reinsurance Group, or Munich Re. Although the entire database is available only to Munich Re clients, the company does allow partial public access. The database includes over 25,000 entries and covers a period from 79 CE to present, recording only "major events" before 1980. Events are entered into the database at both country and event levels. Sources of information include national insurance agencies, Lloyd's, news organizations, United Nations agencies, nongovernmental organizations, world weather services, clients, and subsidiaries. Data can be accessed by selecting one of three categories: annual statistics, long-term statistics since 1950, or significant natural disasters. The annual statistics category details worldwide natural disasters from 2004-2008. Long-term statistics since 1950 include "great natural catastrophes" that caused thousands of deaths or extremely high losses. The third category, significant natural disasters, contains information about the deadliest and most costly natural catastrophes since 1980.

CRITERIA: All loss events involving natural hazards that have resulted in substantial material or human loss.

DATA OUTPUT: Data output depends on the type of search conducted. Information available includes the number of fatalities, injuries, displaced persons, detailed coordinates, economic loss, and scientific data regarding the hazard such as precipitation, wind speed, and intensity.

KEYWORDS: Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Hurricane, Insured loss, Landslide, Severe Storm, Tornado, Tsunami, Volcano, Wildfire, Wind storm, Winter storm

(*Note: See related entry on page 15)*

Munich Re. 2009. Natural Hazards Assessment Network (NATHAN). Munich Re. Available from http://mrnathan.munichre.com/

NATHAN, the NATural Hazards Assessment Network, is an interactive online application based on the Munich Re World of Natural Hazards CD-ROM. The application supports the geographical underwriting of natural hazard risks, which uses "geocoded portfolio and loss data to perform highly precise spatial or geographic portfolio analyses." NATHAN's core function is an interactive world map. Munich Re makes a light version of NATHAN available on their Web site that does not include insurance market statistics or information on insured loss and insurance zones. The full version of NATHAN is available to Munich Re clients. Data comes entirely from Munich Re's NatCat SERVICE database. NATHAN is composed of three modules: natural hazard maps, major disasters, and country profiles. The first module displays a map with a precise distribution of natural hazards and their intensities. The second provides information on the recurrence intervals of natural disasters in a particular area. The third module provides information about individual countries.

DATA OUTPUT: The output of NATHAN depends on the module used. The natural hazards maps module produces an interactive map displaying various hazard types, which are searchable by country, location, coordinates, and hazard type. The major disasters module produces an interactive map displaying hazards, as well as data associated with the current search options. The data includes the date of the hazard, areas affected, type of event, number of deaths, and economic loss. The country profile provides information about a country's geography, government, demographics, economy, transportation, and natural hazards.

KEYWORDS: Earthquake, Economic impact, Fatalities, Flood, Hail, Hurricane, Lightning, Severe Storm, Tornado, Tsunami, Volcano, Wildfire, Winter Storm

(*Note: See related entry on page 14)*

National Center for Atmospheric Research (NCAR) and American Meteorological Society (AMS). 2008. Extreme Weather Sourcebook. The University Corporation for Atmospheric Research. Available from http://www.sip.ucar.edu/sourcebook/

The Extreme Weather Sourcebook contains a summary of economic and societal impacts resulting from severe weather events. The data are acquired from Roger Pielke Jr. and his colleagues at the Center for Science and Technology Policy Research at the Cooperative Institute for Research in Environmental Sciences (CIRES). A number of people have contributed to the database. Their names can be found in the acknowledgments section. Adjustments have been made to the data to allow for apples-to-apples comparisons.

DATA OUTPUT: Total damages (in millions, 2006 U.S. dollars), total wealth adjusted damages (in millions, 2006 U.S. dollars). Data are organized alphabetically by state or by total damage rank. The Web site provides a "Data Sources and Methodology" section detailing data sources and methods for adjustment.

KEYWORDS: Earthquake, Economic impact, Fatalities, Flood, Hail, Hurricane, Injuries, Insured loss, Lightning, Severe Storm, Tornado, Volcano, Wind storm, Winter storm

Sylves, Richard T., Gerard J. Hoetmer, and David P. Racca. 2008. PERI Presidential Disaster Declarations. Public Entity Risk Institute and University of Delaware. Available from http://www.peripresdecusa.org/mainframe.htm

The Presidential Disaster Declaration Web site, created by the University of Delaware with funding from the Public Entity Risk Institute, provides data on presidential disaster declarations from 1953-2008 in the U.S. states and territories. Data are also available on rejected

governor declaration requests. Data retrieved from Federal Emergency Management Agency reports are updated every 12-16 months. The dataset uses a searchable map interface that provides state and county information. After search parameters are entered, a pop-up window displays the requested information. Users can also create a customized declaration summary data table.

DATA OUTPUT: Declaration number, county, date, disaster type, disaster description, cost, and the president and governor involved in the declaration. The cost reported in the dataset is the total amount of federal disaster relief (adjusted to 2008 U.S. dollars) for the affected state. The Web site includes a data description page providing detailed information including sources, a disclaimer, and definitions of variable names and value labels.

KEYWORDS: Drought, Earthquake, Economic impact, Flood, Hurricane, Landslide, Presidential Disaster Declaration, Severe Storm, Terrorism, Tornado, Tsunami, Volcano, Wildfire, Winter Storm

The Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP). 2007. Canadian Disaster Database. Public Safety Canada. Available from http://ww5.ps-sp.gc.ca/res/em/cdd/search-en.asp
The Canadian Disaster Database contains historical information on natural, technological, or conflict (excluding war) disasters affecting Canadian citizens at home or abroad since 1900. There are over 800 entries, searchable by disaster type, location, and time period. Sources of data include the federal government, provincial emergency management organizations, the Insurance Bureau of Canada, nongovernmental organizations, and the news organizations. Entries are occasionally cross referenced with the CRED EM-DAT database. Data are updated as new disasters occur or as new data regarding past disasters are released.

CRITERIA (must meet one of the following): Ten or more fatalities; 100 or more people injured, evacuated, or displaced; a call for national or international assistance; historical significance; or significant damage or interruption of normal processes so the affected community cannot recover on its own.

OUTPUT DATA: Number of people killed, injured, evacuated or displaced; regions affected; description of the event; and estimated cost. Referencing information for the event description and estimated cost also are included in the output.

KEYWORDS: Avalanche, Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Hurricane, Injuries, Landslide, Severe Storm, Technological Hazard, Terrorism, Tornado, Tsunami, Winter Storm

U.S. Geological Survey (USGS). 2009. USGS Earthquake Database. U.S. Geological Survey. Available from http://neic.usgs.gov/neis/epic/epic.html and http://earthquake.usgs.gov/eqcenter/eqarchives/
Developed by the USGS Earthquake Hazards Program, the Earthquake Database contains information about international earthquakes. It extends from 2000 BCE to the National Earthquake Information Center Preliminary Determination of Epicenters program's current week of data. Because a number of earthquake database providers contribute data, users can search through ten different catalogs. The Earthquake Hazard Program also provides an Earthquake Archives section of the Web site that contains substantial historical earthquake data, including lists and maps, earthquake summary posters, and scientific data.

DATA OUTPUT: Catalog source, date, time, location (latitude and longitude), magnitude, and depth. Additional earthquake data are available in the Earthquake Archives section of the Web site.

KEYWORDS: Earthquake, Economic Impact, Fatalities

U.S. National Climatic Data Center (NCDC). 2008. Storm Events Database. U.S. National Climatic Data Center. Available from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms
The Storm Events Database is a U.S. national, county-level dataset containing a chronological listing of hurricanes, thunderstorms, hail storms, floods, drought conditions, tornadoes, snow, temperature extremes, and other phenomena by state. The database contains data from the NCDC Storm Data database (see entry belows) on all U.S. weather events from 1993 to

the present (except June and July, 1993, which are missing), as well as data from the National Oceanic and Atmospheric Administration, National Weather Service, National Centers for Environmental Prediction, and the Storm Prediction Center. Tornado data from 1950-1992, thunderstorm wind data from 1955-1992, and hail data from 1955-1992 are included. Data are generally 120 days behind the current month and is updated monthly, as needed.

OUTPUT DATA: Location, date, time, event type, magnitude, number of fatalities and injuries, amount of property damage, and crop damage.

KEYWORDS: Drought, Economic impact, Extreme Temperature, Fatalities, Flood, Fog, Hail, Hurricane, Lightning, Severe Storm, Tornado, Wildfire, Winter Storm

U.S. National Climatic Data Center (NCDC. 2009. Storm Data. U.S. National Climatic Data Center. Available from http://www.ncdc.noaa.gov/oa/climate/sd/

Storm Data is a name used to describe both a digital data set (DSI-3910) and a publication by the NCDC. Both contain U.S. data listed chronologically, by state, of storm occurrences and unusual weather phenomena. The data begin in 1959 with preliminary data extending back to 1950. Data in the digital dataset begin in 1996 and are provided primarily by the National Weather Service. Storm Data is also used by the National Weather Service Office of Climate, Water, and Weather Services to compile the U.S. Natural Hazard Statistics database, which provides statistics on fatalities, injuries, and damages caused by weather related hazards (see http://www.nws.noaa.gov/om/hazstats.shtml).

DATA OUTPUT: Location or zone, date, time, storm path, number of fatalities and injuries, estimated damage (property and crop), and characteristics of the storm.

KEYWORDS: Drought, Economic Impact, Extreme Temperature, Fatalities, Flood, Hail, Hurricane, Injuries, Severe Storm, Tornado, Lightning, Wind Storm, Winter Storm

U.S. National Climatic Data Center (NCDC) Storm Prediction Center (SPC). 2009. Severe Weather Database Files (1950-2007). U.S. National Climatic Data Center. Available from http://www.spc.noaa.gov/wcm/

Severe Weather Database Files provide downloadable data on tornados, hail, or wind. Tornado data are available from 1950-2007, while hail and wind data are available from 1955-2007. Data are compiled completely from NCDC storm data. The data are downloadable in comma separated value (CSV) format. Access to the CSV files is located at the bottom of the Web page. Full datasets are very large (especially wind and hail). To facilitate faster downloading, files have been divided by decade, or in the case 1950 smf 2000 wind and hail data, by half decade. The Web page includes several maps and charts relating to 2008 tornado trends and occurrences.

OUTPUT DATA: Varies depending on which hazard file is chosen. Data could include: date, time, location (with coordinates and both state and county FIPS codes), scale, hail size, wind speed, number of fatalities and injuries, economic loss, crop loss, storm path, and number of states affected.

KEYWORDS: Economic Impact, Fatalities, Hail, Injuries, Severe Storm, Tornado, Wind storm

U.S. National Flood Insurance Program (NFIP). 2007. Policy and Claim Statistics for Flood Insurance. U.S. National Flood Insurance Program. Available from http://www.fema.gov/business/nfip/statistics/pcstat.shtm

Policy and Claim Statistics for Flood Insurance data contains information gathered by the NFIP. Statistics are categorized into six subheadings: statistics for the current month; statistics by calendar year; statistics by state; statistics by fiscal year (maps); claim information by state (1978 to the current month); policy information by state (as of the current month); and significant floods (1978 to the current month).

DATA OUTPUT: Output depends on chosen statistical category. Data could include event type, year, number of paid losses, amount of paid losses, average paid losses, number of claims, number of policies in force, total premium, or total loss.

KEYWORDS: Flood, Insured Loss

U.S. National Geophysical Data Center (NGDC). 2009. Historical Tsunami Database. U.S.

National Geophysical Data Center. Available from http://www.ngdc.noaa.gov/hazard/tsu_db.shtml

The Historical Tsunami Database is comprised of two related, searchable files. The first file is the Tsunami Source Event Search, which provides information on the source of a tsunami. The second is the Tsunami Runup Search, which provides information on locations where tsunami effects have occurred. Both files contain data on tsunami events occurring in the Atlantic, Pacific, and Indian Oceans, as well as the Caribbean and Mediterranean seas, from 2000 BCE to the present. The database includes an introductory section providing information about data reliability and variable definitions. References for each tsunami file are available in an "Introduction to the Database" section on the Web site.

SOURCE SEARCH DATA OUTPUT: Source location, date, time, event magnitude, maximum water height, total number of fatalities and injuries, and damage for the event.

RUNUP SEARCH DATA OUTPUT: Arrival date and time, travel time, maximum water heights, horizontal inundation distances, fatalities, injuries, and damage for specific locations.

KEYWORDS: Economic Impact, Fatalities, Injuries, Tsunami

U.S. National Geophysical Data Center (NGDC). 2009. The Significant Earthquake Database. U.S. National Geophysical Data Center. Available from http://www.ngdc.noaa.gov/nndc/struts/form?t=101650&s=1&d=1

The Significant Earthquake Database contains information on destructive earthquakes from 2150 BCE to the present. The database is searchable by earthquake parameters and earthquake effects. Data retrieved from the database can be imported into an Excel spreadsheet or displayed and extracted with an ArcIMS Interactive Map. Metadata are available through an NGDC site search.

CRITERIA (must meet one of the following): Moderate damage (~$1 million or more, in 1990 U.S. dollars), 10 or more deaths, magnitude 7.5 or greater, Modified Mercalli Intensity X or greater, or the earthquake generated a tsunami.

DATA OUTPUT: Date, country, location, coordinates, magnitude, intensity, focal depth, number of deaths, death description, damage (in millions, U.S. dollars), damage description, and associated tsunami seiche or volcanic eruption.

KEYWORDS: Earthquake, Economic impact, Fatalities, Injuries

U.S. National Geophysical Data Center (NGDC). 2009. The Significant Volcanic Eruption Database. U.S. National Geophysical Data Center. Available from http://www.ngdc.noaa.gov/nndc/servlet/ShowDatasets?dataset=102557&search_look=50&display_look=50

The Significant Volcanic Eruption Database was created using data from the Smithsonian Institution's Global Volcanism Program. It includes more than 400 significant eruptions from various places around the world.

CRITERIA (must meet one of the following): Caused fatalities, caused moderate damage (~$1 million or more), caused a tsunami, or was associated with a major earthquake.

OUTPUT DATA: Date, name of the volcano, location, coordinates, elevation, type of volcano, volcanic explosivity index, agent, number of fatalities, description of deaths, number of injuries and descriptions, damage (in millions, U.S. dollars), description of damage, number of houses destroyed, and description of destroyed housing.

KEYWORDS: Economic Impact, Fatalities, Injuries, Volcano

U.S. National Hurricane Center (NHC). 2007. Annual Summaries of North Atlantic Storms, 1872-2004 (Monthly Weather Review). U.S. National Hurricane Center. Available from http://www.aoml.noaa.gov/general/lib/lib1/nhclib/mwreviews/mwreviews.html#top

This dataset is a collection of National Hurricane Center documents that have been digitized by the National Oceanic and Atmospheric Agency Miami Regional Library. The dataset is grouped by year, with each year containing several *Monthly Weather Review* publications. Covering the updated period from 1872-2006, it provides annual summary information for North Atlantic storms.

DATA OUTPUT: Varies depending on which year is chosen. All years contain Monthly Weather Review publications with descriptions of that season's storms. Most years include

descriptions of individual storm events, with some events containing detailed information. The individual storm descriptions may include storm track maps, synoptic history of the storm, meteorological statistics, casualty and damage statistics, and warning information. The publications are sometimes supplemented with charts, graphs, maps, and images from the storm.

KEYWORDS: Economic Impact, Fatalities, Hurricane, Severe Storm

U.S. National Weather Service (NWS) Hydrological Information Center (HIC). 2009. Flood Losses: Compilation of Flood Loss Statistics. U.S. National Weather Service. Available from http://www.weather.gov/oh/hic/flood_stats/index.shtml

The database contains two different datasets on flooding. The first is titled Flood Fatalities and contains flood-related death estimates from 1903-2004. Earlier years reflect fatalities from major floods but do not necessarily account for all deaths associated with isolated flooding. The second dataset is called Flood Damages. It contains detailed information about limitations in estimating flood damage. The information within the datasets is approximate because no single agency collects loss data.

FATALITIES DATA OUTPUT: Annual fatality totals are only available from 1903-1996. For more recent years—1997-2004—date, location (state and county), gender and age of the victim, and circumstances of death is available. Recent years also differentiate between vehicle and non-vehicle related deaths.

DAMAGES DATA OUTPUT: Year, unadjusted damage (in thousands, U.S. dollars), construction cost index (CCI) to adjust for inflation, an adjustment factor (that is applied to the unadjusted damage), and adjusted damage (in billions, 2007 U.S. dollars). The data are organized by water years, which start October 1 and end September 30.

KEYWORDS: Economic Impact, Fatalities, Flood

Literature with Data

Ashley, Sharon T., and Walker S. Ashley. 2008. Flood fatalities in the United States. *Journal of Applied Meteorology & Climatology* 47 (3): 805-818. Available from http://chubasco.niu.edu/pubs/JAMC_2008b.pdf

This study compiles a national database of flood fatalities from 1959-2005. Source data comes almost entirely from the National Climatic Data Center Storm Data dataset. Only deaths resulting directly from a flood event were included in the study, while those occurring in coastal waters or along shorelines were not. Fatality estimates from Hurricane Katrina were not included because of inaccuracies in the data. The article details the results from both flood fatality statistics and spatial analysis. Charts, graphs, and maps provide visual representations of the data. The study's results underline specific vulnerabilities—social and physical—associated with floods in the United States.

DATA OUTPUT: Location of flood, age and gender of the victim, activity or setting of fatalities, and the type of flood responsible for each fatality. The article also contains information on the temporal distance of floods in the United States, the most dangerous type of flood, activities and structures most vulnerable to flood-related fatalities, and the demographic characteristics of those who are most vulnerable.

KEYWORDS: Fatalities, Flood, Injuries

Blake, Eric S., Edward N. Rappaport, and Christopher W. Landsea. 2007. *The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851-2006 (and Other Frequently Requested Hurricane Facts)*. NOAA Technical Memorandum NWS TPC-5. National Oceanic and Atmospheric Administration. Available from http://www.nhc.noaa.gov/pdf/NWS-TPC-5.pdf

This report is an extension of the "Deadliest, Costliest, and Most Intense United States Tropical Cyclones" memorandum released in 2005. The update includes data from 2005 and 2006, revised hurricane landfall intensity data from 1851-1914, categorized inland hurricane impacts, new major hurricane statistics, an updated impact assessment of Helene (1958), and new death estimates from Audrey (1957). The report contains lists of the deadliest U.S. tropical cyclones from 1851-2006 and the costliest tropical cyclones in the United States from 1900-2006. Damages, in monetary loss, have been ranked in three ways: contemporary estimates, contemporary estimates adjusted for inflation in 2006

dollars, and contemporary estimates; adjusted for inflation, growth of population, and personal growth in 2006 dollars. The third damage rank uses the revised methodology of Pielke, et al. (2008, Normalized hurricane damages in the United States: 1900-2005. *Natural Hazards Review*. 9 (1): 29-42.) to estimate the economic loss that historical hurricanes would currently cause in at-risk property. The report answers a variety of frequently asked hurricane questions and provides many detailed charts.

DATA OUTPUT: Storm name, year, intensity, number of deaths, and damage (in terms of damage rank listed in abstract).

KEYWORDS: Economic Impact, Fatalities, Hurricane

Brooks, Harold E., and Charles A. Doswell III. 2001. Normalized damage from major tornadoes in the United States: 1890-1999. ***Weather and Forecasting*** **16 (1): 168-176. Available from http://ams.allenpress.com/perlserv/?request=get-document&doi=10.1175%2F15200434(2001)016%3C0168%3ANDFMTI%3E2.0.CO%3B2**

Historical records of damage from major U.S. tornadoes are adjusted for inflation and wealth. Inflation was adjusted by using the Consumer Price Index (CPI), which expresses the cost of goods relative to a fixed point in time. The measure of wealth is "fixed reproducible tangible wealth." The benchmark year chosen for both the CPI and wealth measurement was 1997 because it was the last year for which wealth data were available. The normalization does not take into account population information at the scale of tornado damage. Reliable tornado track and population data are difficult to find for most tornado events affecting small portions of a given county. The article details the methods and findings of the study and includes supporting tables and figures.

CRITERIA: Caused at least 20 fatalities, had an inflation-adjusted damage total of at least $50 million in 1997 dollars, or both.

KEYWORDS: Economic Impact, Fatalities, Tornado

Curran, E. Brian, and Ronald L. Holle. 1997. ***Lightning Fatalities, Injuries, and Damage Reports in the United States from 1959-1994.*** **NOAA Technical Memorandum NWS SR-193. National Oceanic and Atmospheric Administration. Available from http://www.nssl.noaa.gov/papers/techmemos/NWS-SR-193/techmemo-sr193.html**

This report summarizes fatalities and damage from lightning in the United States from 1959-1994. Data used in the report were acquired entirely from the National Climatic Data Center Storm Data dataset. The report details several variations of lightning strikes from the time of day, the month, season, or the day of the week. Charts and graphs throughout the document support report sections.

DATA OUTPUT: Date occurred, state, county, number of fatalities, gender and location of fatalities, number of injuries, gender and location of injuries, and damage report costs. Damage is expressed categorically based on intervals of total cost.

KEYWORDS: Economic Impact, Injuries, Lightning

Pielke Jr., Roger A., Mary W. Downton, and J. Zoe Barnard Miller. 2002. Flood Damage in the United States, 1926-2000: A Reanalysis of National Weather Service Estimates. Boulder, CO: University Corporation for Atmospheric Research. Available from http://www.flooddamagedata.org/flooddamagedata.pdf

This report encompasses a reanalysis of National Weather Service (NWS) flood damage estimates from 1925-2000. The report examines the scope, accuracy, and consistency of NWS estimates for the purposes of improving NWS datasets and recommending how they can be used and interpreted appropriately. Data are compiled from NWS records and publications and supplemented with national and state reports. NWS flood damage data collection and processing from 1934 to present was reasonably consistent, with the exception of 1976-1982. State and federal estimates from 1976-1979 were reconstructed with data from NWS files and other sources. The reanalysis omits 1980-1982 because of a lack of data collection and large errors in estimates.

OUTPUT DATA: The report presents three datasets available in the report and online (www.flooddamagedata.org). The first dataset contains estimated flood damage for the U.S. from 1926-1979 and 1983-2000, by fiscal year. The second

includes estimated flood damage for each state from 1955-1979 by calendar year and fromr 1983-2000 by fiscal year. The final dataset estimates flood damage by river basin for the U.S. from 1933-1975, by calendar year.

KEYWORDS: Economic Impact, Fatalities, Flood, Insured Loss, Severe Storm

Pielke Jr., Roger A., Joel Gratz, Christopher W. Landsea, Douglas Collins, Mark A. Saunders, and Rade Musulin. 2008. Normalized hurricane damage in the United States: 1900-2005. ***Natural Hazards Review*** **9 (1): 29-42. Available from http://www.nhc.noaa.gov/pdf/NormalizedHurricane2008.pdf**

This article is an extension of the work originally published in 1998 by Pielke and Landsea relating to U.S. hurricane damage normalization. This extension focuses on normalizing 1900-2005 mainland hurricane damage to 2005 U.S. dollars. It includes information about the type of data used, normalizing methods, results of normalization, lack of data trends, and conclusions. Normalized values from 1900-2005 are available in the appendix.

DATA OUTPUT: Storm name, year, location, category, normalized damage, damage by decade, damage by category, and damage by population.

KEYWORDS: Economic Impact, Hurricane

Rappaport, Edward N. 2000. Loss of life in the United States associated with recent Atlantic tropical cyclones. ***Bulletin of the American Meteorological Society*** **81 (9): 2065-2073. Available from http://ams.allenpress.com/archive/1520-0477/81/9/pdf/i1520-0477-81-9-2065.pdf**

This article establishes a database to assess the threat to life from Atlantic tropical cyclones in the contiguous United States and adjacent coastal waters. It covers 1970 to 1999, including deaths caused directly by tropical cyclones only. Data was acquired from newspapers and several National Weather Service publications, including Natural Disaster Survey Reports, Service Assessments, preliminary post-storm reports from weather forecast offices, preliminary reports from the Tropical Prediction Center/National Hurricane Center, Storm Data, and the *Monthly Weather Review*.

CRITERIA: Includes fatalities in the contiguous United States and at sea, within 50 nautical miles of the U.S. coast, and during an Atlantic tropical cyclone.

DATA OUTPUT (if available): Name of cyclone; date and time of injury leading to death; cause of death; county or parish of occurrence; strength of cyclone at landfall and at date and time of fatal incident; age and gender of deceased; sources of information; and supplemental notes.

KEYWORDS: Fatalities, Flood, Hurricane, Severe Storm

Swiss Re. 2009. ***Sigma*****. Economic Research and Consulting, Swiss Reinsurance Company Ltd. Available from http://www.swissre.com/pws/research%20publications/sigma%20ins.%20research/sigma%20insurance%20research.html**

Sigma is a periodical, published eight times a year, containing information about international insurance markets, economic trends, and strategic issues in the insurance industry. Reports from 2000 to present are available online in the Sigma archive. Sigma only provides access to a limited amount of data through their Web site. Additional Sigma world insurance data for the period 1980-2007 is available for purchase. Swiss Re uses its Sigma database to compile an annual listing of all human-caused and natural disasters for the past year. Sources of Sigma data include newspapers, primary insurance and reinsurance periodicals, specialist publications, and insurance and reinsurance reports for a given event.

CRITERIA (must meet one of the following): Insured loss: $16.6 million or more in shipping losses, $33.1 million or more in aviation losses, $41.1 million or more in other losses, or total losses of $82.2 million or more. Casualties: 20 or more dead or missing, 50 or more injured, or 2,000 or more displaced. The dollar amounts have been converted to U.S. dollars and adjusted for inflation using end-of-year rates.

KEYWORDS: Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Hail, Hurricane, Injuries, Insured Loss, Severe Storm, Tornado, Tsunami, Volcano, Wind Storm, Winter Storm

Related Literature

Center for Research on the Epidemiology of Disasters (CRED) and U.S. Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDa). 2004. EM-DAT: The OFDA/CRED International Disaster Database—Final Report, January 15, 2002-July14, 2004. U.S. Agency for International Development. Available from http://pdf.usaid.gov/pdf_docs/PDACA744.pdf
This final report analyzes the EM-DAT: Emergency Events Databse from January 15, 2002 to July 14, 2004. It details the collaborative efforts of CRED and several other organizations to develop an active Web server that dynamically displays EM-DAT search results through graphs, tables, etc. The final report is divided into four sections. The first describes activities associated with the project's objectives. The second section discusses the mission and collaborations relating to the project. Part three describes different outputs of EM-DAT. This section also includes EM-DAT citations in several national and international news publications. The final section provides a summarized, statistical overview of EM-DAT use.

KEYWORD: Dataset Evaluation

Cutter, Susan L., and Christopher Emrich. 2005. Are natural hazards and disaster losses in the U.S. increasing? *Eos, Transactions, American Geophysical Union* 86 (41): 381-396. Available from http://www.geophysik.uni-muenchen.de/~malservisi/hazards2006/2005EO410001.pdf
The authors assess whether the abnormally high disaster losses from 2004 and 2005 were isolated anomalies or whether they are part of an increasing trend of losses over the past half century. They analyze the spatial and temporal trends of U.S. natural hazard losses between 1960 and 2003, comparing them to the geographic patterns of presidential disaster declarations over the same period. They conclude that losses from natural hazards are increasing and that weather-related hazards are the leading reason but geographic patterns of presidential declarations do not always match the pattern of hazards losses. The article also includes information about loss estimation and the future of the research.

KEYWORDS: Economic Impact, Presidential Disaster Declaration

Downton, Mary W., and Roger A. Pielke Jr. 2005. How accurate are disaster loss data? The case of U.S. flood damage. *Natural Hazards* 35 (2): 211-228. Available from http://www.springerlink.com/content/x104588437450354/fulltext.pdf (Subscription required)
This paper uses the example of historical flood damage data in the United States to assess disaster loss data. It evaluates the accuracy of historical flood damage estimates from two federal agencies: the National Weather Service (NWS) and the Federal Emergency Management Agency (FEMA). The NWS has compiled annual flood loss estimates for each state since 1955. Comparison of NWS data with similar estimates from five state emergency management agencies reveals substantial disagreement among estimates from different sources. In the 1990s, FEMA began to systematically collect damage estimates and cost data associated with its disaster assistance programs. Comparison of early damage estimates with actual expenditures in a California flood disaster reveals large errors in some estimates for individual counties, but no statistically significant tendency to underestimate or overestimate. Positive and negative errors tend to average out and the total damage estimate for the state approximates the final expenditures. Both comparisons indicate that damage estimates for small events or local jurisdictions often are inaccurate. On the other hand, estimates aggregated over large geographic areas or long time periods appear to be reasonably reliable. This study finds that independent estimates for events with losses greater than $500 million disagree by as much as 40 percent. The paper suggests ways of interpreting and using such loss estimates to reduce the likelihood of misinterpretation.

KEYWORDS: Economic Impact, Flood

Green III, Walter G. 2003. Changes to the Disaster Database Project. Richmond, VA: Walter G. Green III. Available from http://facultystaff.richmond.edu/~wgreen/DDPchanges.pdf
The database at the University of Richmond's Disaster Database Project required improved search capabilities and additional reports. This report discusses changes in geolocation, event classification, phases, coding event types, ex-

panding search capabilities, and factor identification with the database project.

KEYWORDS: Dataset Evaluation, Avalanche, Drought, Earthquake, Extreme Temperature, Fatalities, Flood, Hail, Injuries, Landslide, Severe Storm, Terrorism, Tornado, Tsunami, Volcano, Wildfire, Wind Storm, Winter Storm

Guha-Sapir, Debarati, and Regina Below. 2002. *The Quality and Accuracy of Disaster Data: A Comparative Analyses of Three Global Data Sets*. Brussels: Centre for Research on the Epidemiology of Disasters. Available from http://www.cred.be/docs/cred/publications/sapir.pdf

In an attempt to strengthen the EM-DAT as a reliable and consistent data source, the authors compare the strengths and weaknesses of the EM-DAT, NatCat, and Sigma databases. Records of natural disasters during the 15-year period from 1985-1999 were analyzed for four countries: Vietnam, India, Honduras, and Mozambique. The information was placed into a matrix, then cross-referenced by seven variables: date, disaster type, fatalities, homelessness, injuries, effects, and damage. The researchers made three comparisons among the databases: an overall summary of similarities and differences, the presence or absence of particular disasters in each, and a comparison of the contents of common fields for entries present in more than one database. The report includes results, conclusions, and recommendations based on results of the analysis.

KEYWORD: Dataset Evaluation

Kunkel, Kenneth E., Roger A. Pielke Jr., and Stanley A. Changnon. 1999. Temporal fluctuations in weather and climate extremes that cause economic and human health impacts: A review. *Bulletin of the American Meteorological Society* 80 (6): 1077-1098. Available from http://ams.allenpress.com/archive/1520-0477/80/6/pdf/i1520-0477-80-6-1077.pdf

This paper reviews recent work on 20th Century trends in societal impacts—direct economic losses and fatalities—in the United States from extreme weather conditions, comparing them with trends of associated atmospheric phenomena. Most measures of the economic impacts of weather and climate extremes over the past several decades reveal increasing losses. But trends in most related weather and climate extremes do not show comparable increases with time. This suggests increasing losses are primarily due to increasing vulnerability arising from a variety of societal changes, including a growing population in high-risk coastal areas and large cities, more property susceptible damage, and lifestyle and demographic changes subjecting lives and property to greater exposure. Flood damages and fatalities have generally increased in the past 25 years. While some have speculated that this might be due in part to a corresponding increase in the frequency of heavy rain events, the climate's contribution to the observed impact trends remains to be quantified. There has been a steady increase in hurricane losses. However, when changes in population, inflation, and wealth are considered, there is a downward trend instead. This is consistent with observations of trends in hurricane frequency and intensity. Increasing property losses attributable to thunderstorm-related phenomena (winds, hail, tornadoes) are explained entirely by changes in societal factors. Winter storm damages have increased in the last 10–15 years and this appears to be partially because of increases in the frequency of intense nor'easters. There is no evidence of changes in drought-related losses (although data are poor) and no apparent trend in climatic drought frequency. There is also no evidence of changes in the frequency of intense heat or cold waves.

KEYWORDS: Economic Impact, Extreme Temperature, Fatalities, Flood, Hail, Hurricane, Insured loss, Severe Storm, Tornado, Winter Storm

Munich Re. 2009. Brief Guide: How to Operate NATHAN. Munich: Munich Re. 2009. Available from http://www.munichre.com/en/ts/geo_risks/nathan/how_to_operate_nathan.aspx

Designed to help with using the NATHAN information service, this Web site provides a brief description of how to navigate the user interface. Recommendations are also given as how to best use the three modules—natural hazard maps, major disasters, and country profiles. The guide advises on how to determine which hazard types play a part in a particular location, how to filter search results by time period, and how to acquire information about a certain country.

KEYWORD: User Guide, Earthquake, Economic impact, Fatalities, Flood, Hail, Hurricane,

Lightning, Severe Storm, Tornado, Tsunami, Volcano, Wildfire, Winter Storm

Munich Re. 2003. NatCat SERVICE: A Guide to the Munich Re Database for Natural Catastrophes. Munich: Munich Re. Available from http://www.munichre.com/publications/302-03901_en.pdf

This guide was created by Munich Re to help users familiarize themselves with its NatCat SERVICE database. It includes explanatory information about the nature of NatCat SERVICE, the structure of the database, and the type of information found within it. The guide also provides background information about where the data comes from and how loss amounts are determined. Finally, the guide describes the products supplied by NatCat SERVICE, how and where the data can be accessed, and who uses the information service.

KEYWORD: User Guide, Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Hurricane, Insured loss, Landslide, Severe Storm, Tornado, Tsunami, Volcano, Wildfire, Wind storm, Winter storm

National Research Council (NRC) Committee on Assessing the Costs of Natural Disasters. 1999. The Impacts of Natural Disasters: A Framework for Loss Estimation. Washington, D.C.: National Academies Press. Available from http://www.nap.edu/openbook.php?isbn=0309063949&page=27

The Federal Emergency Management Agency requested the NRC Board of Natural Disasters to appoint an expert committee to give advice on compiling disaster loss estimates. The experts provide their collective recommendations about which data should be consistently used to compile loss estimates, as well as how to establish a hazard impact measurement. The report is comprised of four main sections: estimating the losses of natural disasters, direct losses of natural disasters, indirect losses of natural disasters, and conclusions and recommendations.

KEYWORD: Economic Impact

Tschoegl, Liz, Regina Below, and Debarati Guha-Sapir. 2006. *An Analytical Review of Selected Data Sets on Natural Disasters and Impacts*. Brussels: Centre for Research on the Epidemiology of Disasters. Available from http://www.em-dat.net/documents/Publication/TschoeglDataSetsReview.pdf

This is an analysis of existing disaster loss databases. The report includes more than 30 databases, divided into four categories: international, national, regional, and event specific. Each entry is accompanied by a description, associated strengths and weaknesses, and a link. There is also a methodology section.

KEYWORD: Dataset Evaluation

United Nations International Strategy for Disaster Reduction (UNISDR) and Centre for Research on the Epidemiology of Disasters (CRED). 2009. *CRED Disaster Figures: Deaths and Economic Losses Jump in 2008*. Geneva: United Nations International Strategy for Disaster Reduction. Available from http://www.reliefweb.int/rw/RWFiles2009.nsf/FilesByRWDocUnidFilename/LSGZ-7NJKJV-full_report.pdf/$File/full_report.pdf

This UNISDR report shows an increase in deaths and economic losses in 2008 compared to the 2000-2007 yearly average. The report was compiled using data from CRED's EM-DAT database. Tables and graphs provide visual representations to supplement the document.

KEYWORDS: Drought, Earthquake, Economic Impact, Extreme Temperature, Fatalities, Flood, Hurricane, Landslide, Severe Storm, Volcano, Wildfire

U.S. National Climatic Data Center (NCDC). 1998. Storm Data Publication Explained. National Climatic Data Center. Available from http://www.ncdc.noaa.gov/oa/climate/stormdataexplained.html

This Web page explains the structure of the Storm Data publication, helping users understand the publication's layout. The page describes the data column components and provides definitions for the associated components.

KEYWORD: User Guide

Appendix

Hazard Loss Database Keywords

Avalanche
Dataset Evaluation
Displacement
Drought
Earthquake (includes earthquake induced tsunami OR associated volcano)
Economic Impact (includes loss to overall economy, property loss, crop loss, damage)
Extreme Temperature (not including blizzard, winter storm, ice storm)
Fatalities
Flood (coastal, flash, riverine)
Fog
Hail
Hurricane (tropical cyclone, typhoon)
Injuries
Insured Loss
Landslide (includes mass movement, mudslide)
Lightning
Pandemic
Presidential Disaster Declaration
Severe Storm (thunderstorm, extra tropical storms, tropical depression)
Technological Hazard (HAZMAT, chemical, nuclear power, blackouts)
Terrorism
Tornado
Tsunami
User Guide
Volcano
Wildfire
Wind Storm (does not include tornado or hurricane)
Winter Storm (includes blizzard, ice storm)

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