

Georeferencing the footprint of natural disasters

The Emergency Events Database (EM-DAT) contains data about the occurrence and impact of natural and technological disasters that have taken place since 1900. The database supports humanitarian action at national and international levels, helps decision makers with disaster preparedness and provides an objective base for vulnerability assessments and priority setting.

Measuring disasters' impact is as important as it is challenging and requires innovative thinking. In 2014, EM-DAT launched an effort to enhance its contents by geocoding natural disasters from 2000 onwards; therefore, developing the potential for spatial data to support epidemiological analyses.

The EM-DAT team has now georeferenced the main types of natural disasters including: earthquakes, volcanic activities, mass movements (dry), floods, landslides, storms, extreme temperatures, droughts and wildfires in the world from 2000 to 2015, adding up to over 5,900 disasters. Over that period, around 3.2 billion people were affected and 1.2 million deaths were reported, with the economic losses amounting to \$2.06 trillion USD.

Methodology

- A standardized methodology has been applied to each disaster reported into the EM-DAT database.
- The name of the area(s) impacted by a disaster is (are) extracted from a various panel of sources used by EM-DAT, including UN agencies, non-governmental organizations, (re)insurance companies and press agencies.
- This location data (text format) is transformed into GAUL2015 administrative unit codes (FAO, 2015) through EM-DAT's interface.
- Disasters are recorded both at the 1st and 2nd administrative levels of the GAUL database, depending on the availability of the data and on the impact a disaster had in a country.
- A shapefile (GIS format), which is a polygon highlighting the affected administrative regions (defined as "footprint" of a disaster), is created for each disaster based on the selected GAUL2015 codes.

- Finally, the centroid of each country-disaster's footprint is created, which allows to retrieve the corresponding latitude and longitude of each country-event.

Challenges

The accuracy and completeness of the georeferenced data are directly linked to the information reported by the various sources used within EM-DAT. Those sources often report different location information without mentioning the corresponding administrative unit level (e.g. names of cities, districts, provinces). Reports rarely specify if the listed areas represent all the affected locations (exhaustive study) or only the most affected places. Moreover, different sources are often reporting different location information. A great step forward would be to come to an agreement between the different sources in adopting a standardized way of reporting location information. Finally, because the GAUL dataset doesn't provide a second administrative level for each country and because sources might report information at the first administrative level only, geocoding at this level of precision can be compromised.

What's next?

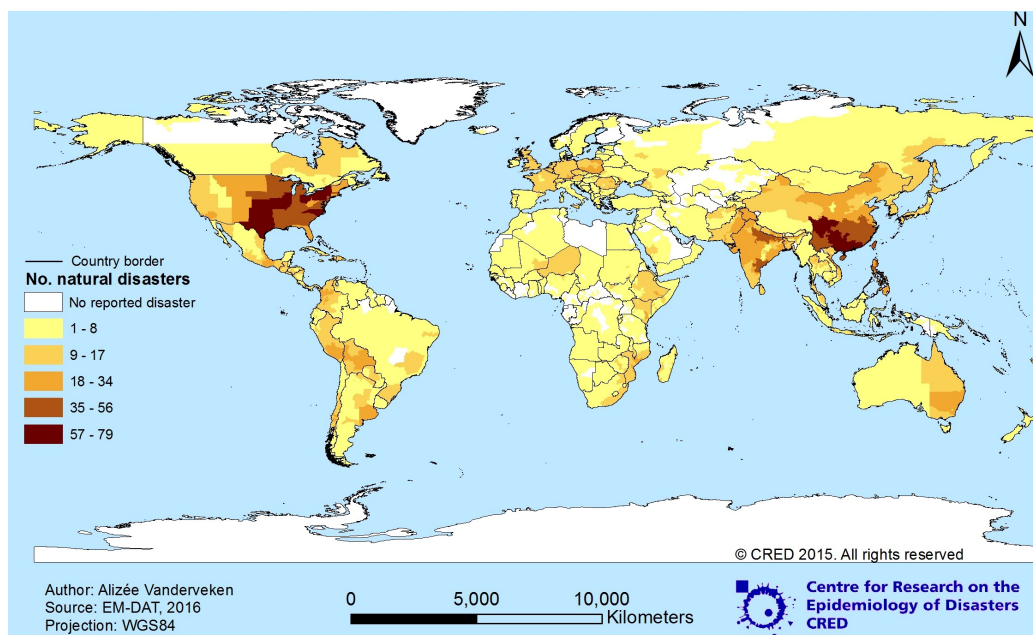
The EM-DAT team is continuously working on its georeferencing process, which is a labor intensive and time consuming exercise.

The upcoming tasks will be to georeference events from 2016 onwards and compute new variables such as the "Population Potentially Affected" (PPA) and the "Area Potentially Affected" (APA) by each specific country-disaster (in km²). Publications by CRED on our geocoding activities will be available soon, and news can be followed through our website: www.emdat.be or www.cred.be; Facebook: @creducl and Twitter: @CREDUCL.

Finally, one of the next steps consists of the development of a dynamic mapping interface, which will allow users to visualize specific data of interest.

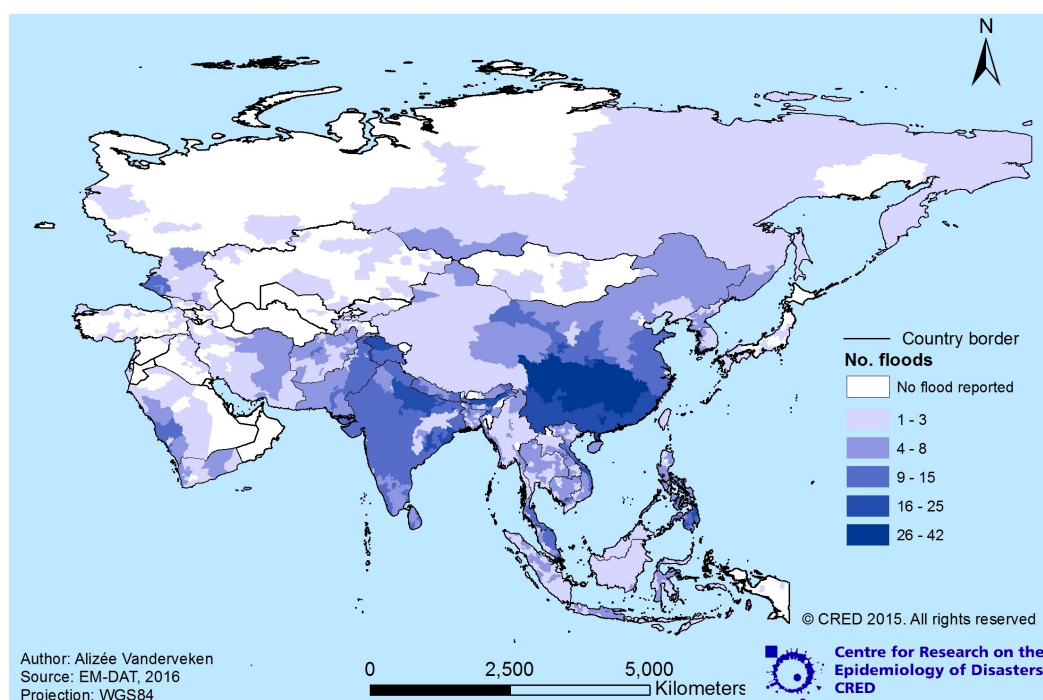
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Figure 1. Number of reported natural disasters by administrative unit (level 2), 2000-2015.



The number of reported natural disasters varies spatially within specific countries. Within the period 2000-2015, the administrative units (level 2) that were characterized by the highest occurrence of natural disasters were all part of counties or prefectures located in the eastern part of the USA (Missouri, Texas, Oklahoma, Illinois, New York, Pennsylvania, Kansas), or the southern part of China (Guangdong, Sichuan and Guizhou).

Figure 2. Number of reported floods by administrative unit (level 2) in Asia, 2000-2015.



Flooding is a widespread phenomenon in Asia, touching almost all countries, but with the highest occurrences in southern China (most affected prefectures located in Guizhou, Hunan, Sichuan, Hubei, Jiangxi, Chongqing Shi, Guangdong and Guangxi Zhuangzu Zizhiqu provinces) and in the north-east of India (most affected district located in Assam province).

CRED News

- ◆ Technical Advisory Group meeting in Washington, October 24th and 25th. Topics: improvement of EM-DAT, collaborative data exchange and users feedbacks, mortality and economic losses data reporting, georeferencing disasters.
- ◆ Workshop on heat and health (invitation only) in September. Aim: present the results from a case study carried out by CRED within an EU funded project called ENHANCE to relevant stakeholders in Belgium and the Netherlands.
- ◆ A study is currently being carried out to determine the pattern in terms of age and gender of people affected by disaster. For this, the CRED team has designed field studies in two towns in Leyte, the area of the Philippines that was hit the hardest by typhoon Haiyan in 2013.