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Social and economic benefits, supporting sustainable development, measures taken and proposed for the implementation of resolutions

Toponym usage in response to the earthquake disaster in Cianjur Regency

Submitted by Indonesia[**]

Summary:

A devastating earthquake with a magnitude of 5.6 struck Cianjur Regency, West Java Province, Indonesia, on 21 November 2022, resulting in casualties and severe damage to buildings. During the disaster response and recovery, geographical names helped stakeholders to identify locations, plan evacuations, visualize the affected area and communicate the disaster situation to the public.

The report describes how geographical names in the Indonesian geographical names information system, Sistem Informasi Nama Rupabumi (SINAR), were shared and utilized in response to the earthquake disaster in Cianjur Regency. Furthermore, the stories, histories and reasons behind the coining of geographical names in the affected area are explained in order to offer any interrelated information that may be beneficial to disaster management.

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Toponym usage in response to the earthquake disaster in Cianjur Regency

Introduction

On 21 November 2022 at 13:21:10 (UTC+7:00), a 5.6-magnitude earthquake hit Cianjur Regency, West Java, Indonesia. At a depth of 10 kilometers, the epicenter was located at 6.84 South Latitude and 107.05 East Longitude in Warungkondang District, 760 meters from Cugenang District, and 1.6 kilometers from Gekbrong District. The Regent of Cianjur issued the Decree of Regent of Cianjur Regency, number: 360/8717/BPBD/2022, on the same day when the earthquake hit, stating the Emergency Response Status for the Cianjur Earthquake for 30 days, starting from November 21 to December 20, 2022, with the possibility of extension depending on the situation and conditions in the field.

According to the official statement from the Cianjur Regency Government, 602 people had died, 916 people were severely injured, and 2,023 people were slightly injured. Furthermore, 59,889 houses were damaged, of which 14,581 were severely damaged, 17,198 were moderately damaged, and 28,110 were slightly damaged. The earthquake also affected most public facilities, including 701 educational facilities, 18 health facilities, 281 houses of worship, and 18 government buildings. In addition to damaging houses and public infrastructure, the earthquake triggered landslides near the epicenter, particularly in Cugenang District's Cijedil, Galudra, and Sukamulya Villages. Earlier, the Indonesian Agency for Meteorological, Climatological, and Geophysics had issued a warning to be alert for additional natural calamities such as floods and landslides. The warning specifically targeted peoples residing in the hillside, valley, and riverbank regions of Cianjur[1].

During the emergency response phase, the Geospatial Information Agency (*Badan Informasi Geospasial* - BIG), as the National Names Authority and the National Mapping Agency of Indonesia, provided geospatial data and information regarding the Cianjur earthquake. These data and information are available to the public, so emergency-response teams can use them to conduct search and rescue missions and implement response plans. BIG, through its social media, has released an infographic showcasing the location of the earthquake disaster in Cianjur Regency and a list of geospatial data and information. BIG provides the digital topographic maps of Cianjur Regency in 1:25,000, thematic geospatial data of vulnerability to disasters and land systems, and geographical names data obtained from SINAR.

Geographical names data collection and utilization by Cianjur Regency and West Java Province

As of 22 November 2022, the West Java Province has verified 88,430 out of 104,365 collected geographical names. Specifically, in Cianjur Regency, there are 31,835 data collected, and 27,731 of them have been verified. Most data collected in Cianjur Regency are toponyms of houses of worship, residence, transportation, and educational facilities, with more than 4,000 data (Fig. 1). Typically, the density of geographical names in Cianjur Regency is between 36-183 data in 1 km^2. The densest geographical names are in the northern part of Cianjur Regency, specifically in Bojongpicung District, Cianjur District, Cibeber District, Cikalongkulon District, Cilaku District, Cipanas District, Cugenang District, Gekbrong District, Haurwangi District, Karangtengah District, Pacet District, and Warungkondang District. Meanwhile, the areas with the least dense geographical names are in the southern part, specifically in Naringgul District, Cidaun District, Cibinong District, and Cikadu District (Fig. 2).

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[1] Retia Kartika Dewi, "Peringatan BMKG Soal Bencana Longsor dan Banjir Bandang Pascagempa Cianjur", *Kompas,* https://www.kompas.com/tren/read/2022/11/22/121100365/peringatan-bmkg-soal-bencana-longsor-dan-banjir-bandang-pascagempa-cianjur?page=all (Accessed: 2 March 2023)
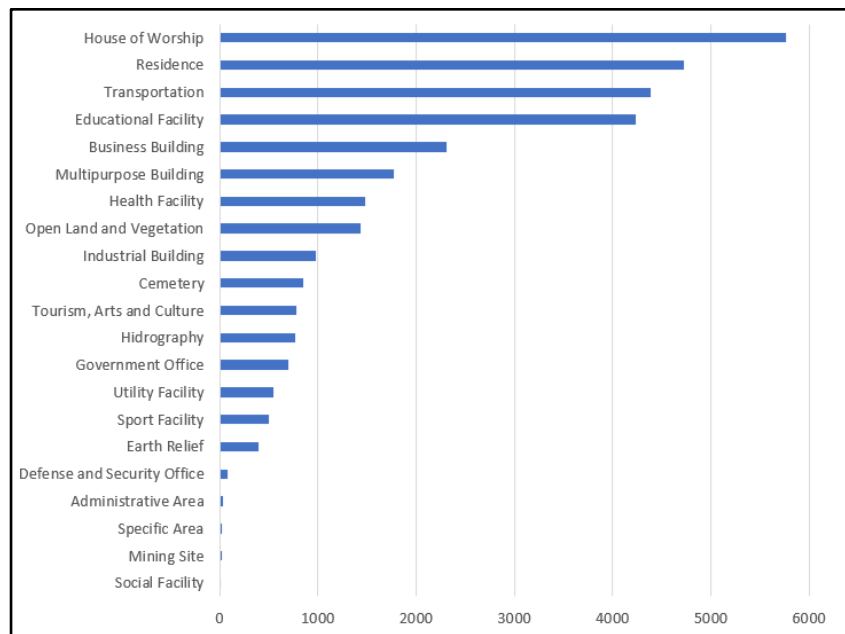
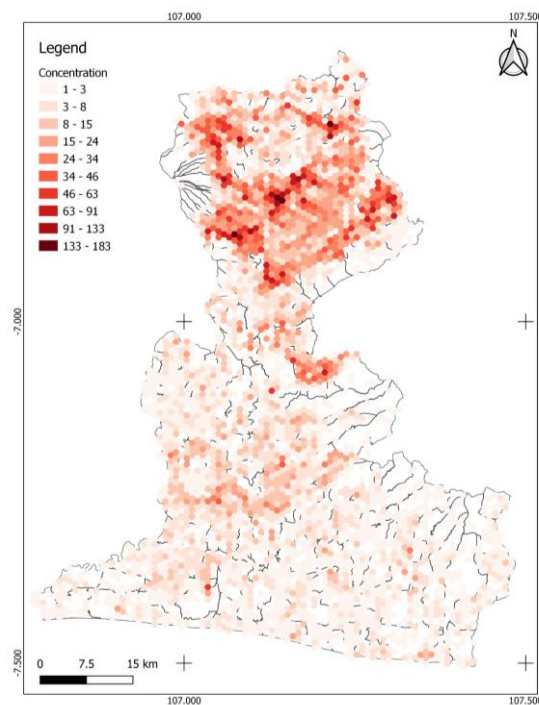Figure 1. Cianjur's toponym data collected in the SINAR

Figure 2. Density map of toponym data in Cianjur Regency

Geographical names data consisting of village names, administrative areas, and public facilities were used to evacuate victims during search and rescue operations carried out by professional emergency-response teams and local authorities. These data were also utilized to speed up the logistics distribution and reporting process, as well as spatially analyze the affected area. Furthermore, the Communication and Information Technology Office of West Java Province extracted geographical names representing public open space or open fields from the SINAR database to identify prospective emergency shelter locations. The spatial distribution of the data is shown in Fig. 3.
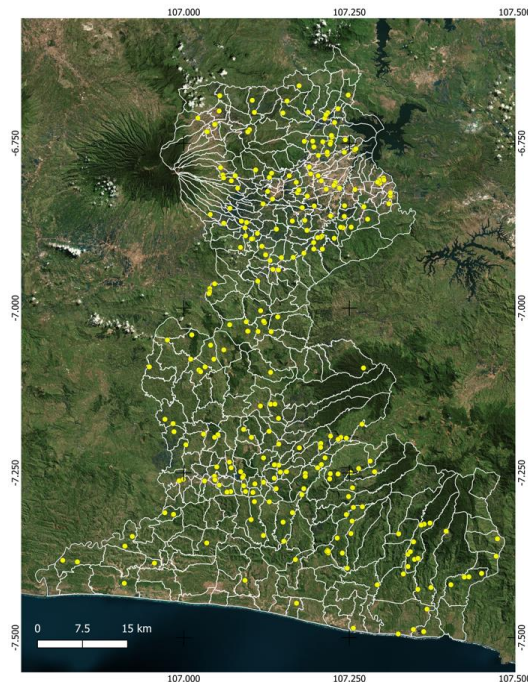
Figure 3. Spatial distribution of geographical names represents public open space or open fields in Cianjur Regency

In addition, the West Java Provincial Government and the Cianjur Regency Government are working together to create a digital platform and utilizing geographical names data to meet the massive and measurable logistical needs. This platform, called Pisodapur (*Pusat Informasi dan Koordinasi Gempa Cianjur -* Coordination and Information Centre of Cianjur Earthquake), is dedicated to disseminating information to the public about earthquake-related casualties, damaged homes, affected areas, the latest news on earthquake-related information, and donation reports (Fig. 4).
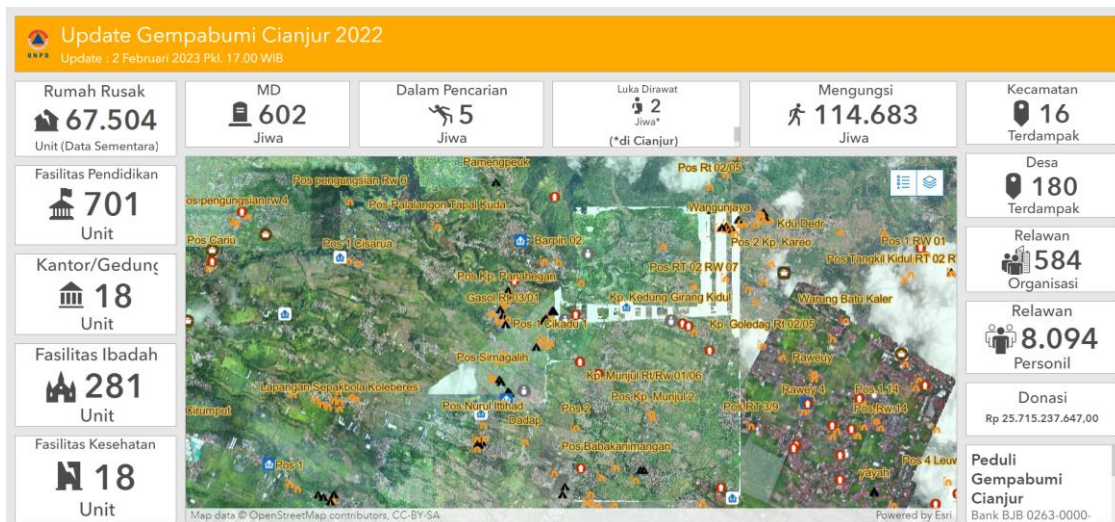

Figure 4. Geographical names as one of main sources of information in the earthquake impact analysis (source: https://pisodapur.jabarprov.go.id/)

Exploring the significance of the names and their meaning to the occurrence of landslides following an earthquake

The rapid response team of BIG conducted a field survey after the landslide disaster using the unmanned aerial vehicles. The survey aimed to map the most affected areas: Cijedil, Galudra, and Sukamulya Villages, as well as their surrounding areas, and assess the possibility of future landslides areas (Fig. 5). According to the survey, the main causes of landslides in these regions were the gradient of the slopes, vegetation, drainage and water, and soil quality.

Figure 5. A field survey was conducted by the rapid response team of BIG to map the area affected by the landslides

In order to facilitate the rehabilitation and reconstruction efforts in the aftermath of the disaster, geographical name data was superimposed onto the affected landslide zones. The geographical name data was used to determine the types of features that were impacted by the earthquake. The results indicate that the toponyms of tourism, arts, culture, and transportation in Cijedil Village were the most affected by the landslides, while the toponyms of house of worship and transportation in Sukamulya Village were the most impacted. However, in Galudra Village, there were no impacted toponyms as the landslide took place in an area covered only by vegetation without any buildings (Fig. 6).

In addition, an examination was conducted on the significance behind the names on the geographical names data in the Cianjur Regency to determine their correlation with potential natural disasters. This investigation aimed to shed light on the relationship between the names and the disaster. The finding reveals that there are certain geographical names that have associations with the potential natural disasters. In Cianjur Regency, specifically in Warungkondang District, there is a village named *Cieundeur. Cieundeur* is from Sunda language. "Ci" means water and "endeur" means to vibrate or shake. Nonetheless, further investigation is required to determine whether "eundeur" is associated with the earthquake that was caused by volcanic activity from Mount Gede, which is located 16 kilometers away, or by tectonic movement[2]. As it turns out, Cieundeur Village is just 7.5 kilometers from the epicenter of the November 21st, 2022 earthquake.

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[2] Titi Bachtiar, "Cieundeur dan Gempa Cianjur", *Ayo Bandung,* https://www.ayobandung.com/netizen/pr-795810355/cieundeur-dan-gempa-cianjur?page=2 (Accessed: 2 March 2023)
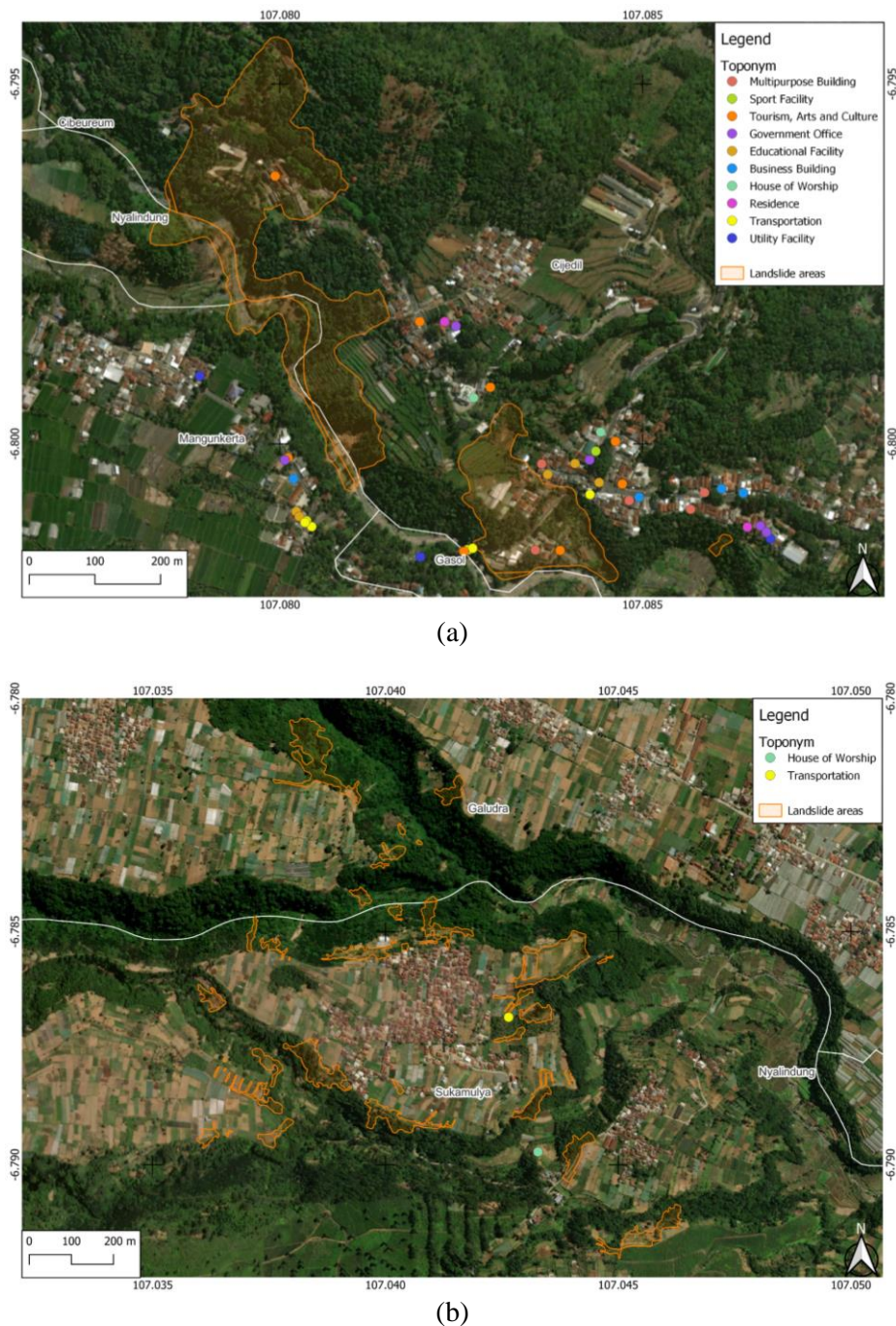
(a)

(b)

Figure 6. Types of geographical features that were impacted by the landslides following an earthquake in: (a) Cijedil Village and its surroundings, and (b) in Galudra and Sukamulya Villages

Insights gained from the use of geographical names in response to the disasters

Standardizing geographical names is important not only for effective governance but also for managing disasters. Geographical names can serve as primary or supporting information during different stages of a disaster, aiding in evaluation and analysis. The collection and standardization of geographical names by all stakeholders have enabled their use in disaster management. Additionally, studying the stories, histories, and reasons behind these names reveals their potential for alerting individuals to impending earthquake disasters and aiding in mitigation efforts.

Moreover, geographical names data have proven to be a valuable information source in disaster management. In the future, the SINAR database's geographical names data can be incorporated into various disaster management applications like Pisodapur, enhancing their interoperability and practicality.

Points for discussion

The Group of Experts is invited to:
1. Express its views on the report and issues in utilizing geographical names in response to the disaster.
2. Consider and compare different practices of utilizing geographical names in response to the disaster.