HAZE CRISIS ANALYSIS AND VISUALIZATION TOOL

Tracking the impact of Indonesia's forest and peatland fires

The forest and peatland fires, which occur on an annual basis in Indonesia, affect the entire Southeast Asian region resulting in extensive environmental destruction and threatening livelihoods. Indonesian disaster management authorities are looking for more timely and effective means of tracking and managing the impact of fire and haze events. Pulse Lab Jakarta, in collaboration with the Government of Indonesia, developed 'Haze Gazer,' a crisis analysis tool that provides real-time situational information from various data sources to enhance disaster management efforts. The prototype uses advanced data analysis of sources including: satellite imagery, information on population density and distribution from government databases, citizen-generated data and real-time data from social media. The capability afforded by the tool can enhance disaster risk management efforts to protect vulnerable populations as well as the environment.

WHY A HAZE CRISIS ANALYSIS TOOL?

In 2015, 116,000 fires were detected in Indonesia, emitting carbon at a rate of 15-20 million tons per day at their peak. They spread across a total of 2.61 million hectares of forest and peatland, resulting in choking haze blanketing numerous areas for no less than five months, including parts of neighboring countries.

Indonesian disaster management authorities currently manage peatland fires and haze events based on hotspot data from satellites as well as static data on population density and distribution. To effectively respond to forest fire haze events, disaster management authorities require additional information on the dynamics of the disaster, especially on the behaviour of haze affected communities.

To provide timely and high-resolution data on fire and haze events across Indonesia, Pulse Lab Jakarta worked with the Government to develop a haze crisis analysis and visualization tool, the 'Haze Gazer.' The tool produces real-time situational information from diverse data sources, including insights on what people do and how communities cope during such disasters.

WHAT ARE THE OBJECTIVES?

Provide real-time information on the location of fire and haze hotspots,

Provide real-time, high-resolution data on the location of the most vulnerable populations,

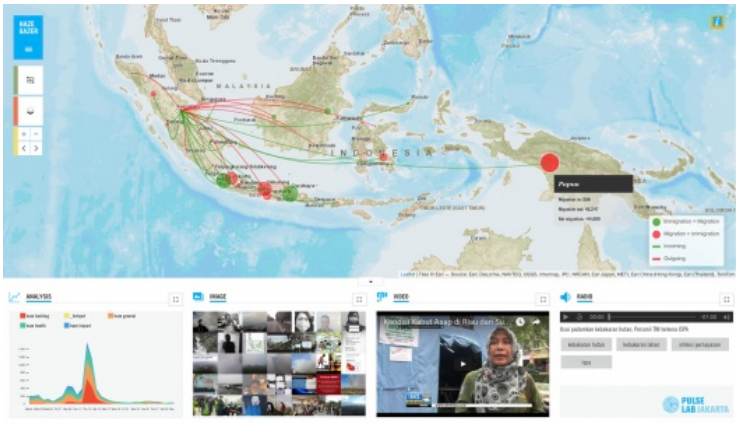
Pinpoint the regions most affected by fire and haze events,

Identify the movement patterns and in-situ behaviour of affected populations to determine emergency response strategies.

HOW DOES THE TOOL WORK?

Haze Gazer was developed based on previous feasibility studies conducted in 2014 and 2015 to understand haze dynamics with social media data. The results of the feasibility studies demonstrated that twitter data can be used to understand the movement patterns and in-situ behaviour of affected populations during and immediately after major fire and haze events.

The crisis analysis tool is a web-based decision support system, which harnesses multiple sources of data including (1) open data in the form of fire hotspot information from satellites and baseline information on population density and distribution, (2) citizen-generated data from the national complaint system in Indonesia called LAPOR! as well as citizen journalism from videos uploaded to an online news channel and (3) real-time big data from social media channels, online video channels, like YouTube, and online photo sharing platforms, such as Instagram.

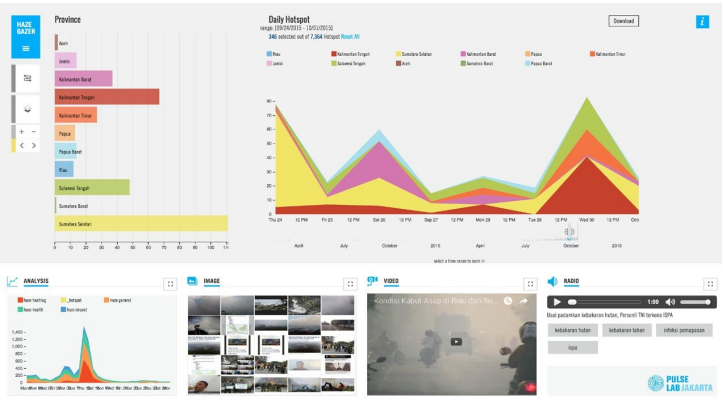


The tool integrates the existing functionalities of the information system used by the Indonesian disaster management authorities, namely insights on the locations of hotspots, and adds new functions and insights based on multiple digital data sources.

Tool functionalities:

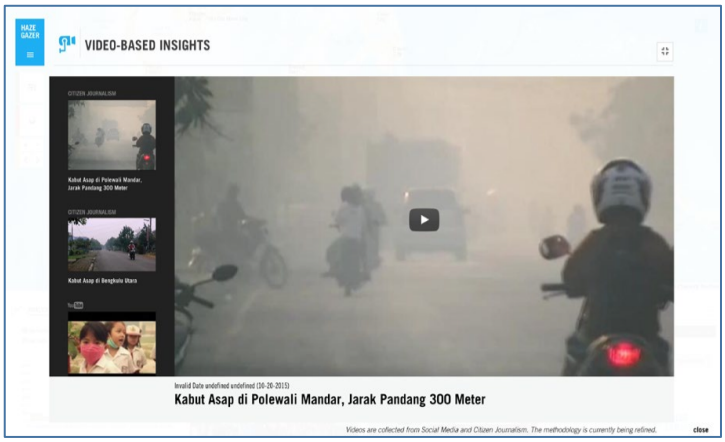
The platform is categorized into different sections based on the type of data source and information provided:

- The platform includes several **overall selection criteria** that allow for a more in-depth analysis of fire and haze events:
    - Region/Province and Timeline = can be selected to get accurate data on a specific location or region during a specified timeframe
    - Mobility = displaying the patterns of population movement within the given timeframe and region
    - Baseline = showing the hotspot distribution and cluster points
- One of the features included in the tool is an **analysis dashboard** that combines information from social media data and the national complaint system to provide information on population mobility and local response strategies.



In the analysis window, users can monitor trends on what affected populations are saying and reporting on haze: health conditions, socio-economic impacts, popular social media hash tags, Instagram pictures and videos.

- The other three functionalities include: **Image based insights** from online photo sharing channels; **video-based insights** from online video channels and **radio content** from pubic radio discussion forums.



DATA PRIVACY

The methodology uses aggregation and a degree of user-anonymity in order to preserve the privacy of individuals and groups. The data is collected from national complaint systems and public online media sources to identify fire and haze hotspots and target emergency response at the meso-level, such as community or regional level, and not the micro level. Moreover, the content is filtered by relevant keywords for topics of interest and only that information is made available for analysis.

POTENTIAL APPLICATIONS

The tool is currently being tested with and improved based on feedback from disaster management practitioners. Haze Gazer has the potential to enable Indonesia's local (BPBD) and national (BNPB) disaster management authorities to target their interventions and to align their efforts with those of affected populations to increase community resilience.

In 2015, one of the areas most affected by haze was the Indonesian province of Riau. If a similar event were to occur this year, disaster management authorities would be able to use the Haze Gazer to overlay geographic hotspots with categories like the distribution of vulnerable populations as well as information on mobility. This would give authorities a better idea of how people react to disasters and where to target their emergency assistance.

CONCLUSIONS

Combining hotspot satellite information and data from Indonesia's national complaint system LAPOR! with online social media analysis can provide additional real-time insights on disaster impact and recovery on the ground. Further research could be conducted to verify the potential of other data sources, such as data from sensors. In addition, the tool could be replicated and applied for other types of disasters and humanitarian actions.

The platform could be scaled up to cover the Southeast Asia region to inform haze-related humanitarian efforts and improve regional resilience.

Eventually, Haze Gazer could be made available to the general public to allow people in haze-affected areas to learn from one another's response strategies, thus contributing to building individual resilience.

Visit website:

http://hazegazer.org/

HOW TO CITE THIS DOCUMENT:

UN Global Pulse, "Haze Gazer: A crisis analysis tool," Tool Series, no. 2, 2016.