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Transboundary Haze in Indonesian and Malaysian News Media: Corpus-Assisted Ecolinguistics

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Abstract

Transboundary haze has gained critical attention from global scholars since its impacts on society, economics, and health are prevalent in the mass media. By applying a corpus-ecolinguistics framework, this study examines the discourse of transboundary haze in Indonesian and Malaysian news media, broadcast between 2015 and 2024. This study 1) analyses the themes of transboundary haze news in Indonesian and Malaysian media, and 2) interprets the themes represented in the discourse ecologically. Using corpus analytical tools provided by Sketch Engine, this study examined the corpus keywords, collocations, and concordances. The findings show that, despite some identical themes, Indonesian mass media foreground the fire's location, mitigation action, and non-human species impacted by the haze. In contrast, Malaysian mass media focuses on the affected areas and health issues. Both media involved similar strategies to frame the government as the responsible agent for mitigating the fires and haze. Ecologically, the discourse of transboundary haze in Indonesian and Malaysian mass media is ambivalent. In Indonesian media, transboundary haze is regarded as a disaster rather than a conflict due to human activities related to land clearings, whereas Malaysian media captures transboundary haze as a health and pollution issue. The ambivalent discourse is

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proven by the lack of human activities that cause transboundary haze, even though the media advocates for environmental and health issues as prevalent themes in news broadcasts. Ecologically, this study recommends that mass media emphasize the anthropocentric causes of transboundary haze to raise public awareness about human activities and their environmental consequences.

Keywords: Corpus, discourse, ecolinguistics, haze, mass media.

1. INTRODUCTION

Despite climate change, a notable environmental problem that requires academic attention from a linguistic viewpoint is the discourse surrounding transboundary haze, which impacts many sectors of life, including health, government policy, and economics (Du et al., 2024; Forsyth, 2014; Sulong et al., 2017). Transboundary haze is closely related to forest fires that have happened for decades in Indonesia. Research reports that forest fires are caused mainly by land clearings for agricultural activities and swamp shrub burning (Aminah et al., 2020; Thoha et al., 2019). Transboundary haze is regarded as the direct impact of forest fires, affecting the flight, health, and air pollution of Indonesia's neighbouring countries, particularly Malaysia. Therefore, it is essential to examine how mass media in both countries portray the transboundary haze to the public. Due to its severe environmental and economic impact, the transboundary haze has attracted scholars' attention. Research reports that the worst forest fires in Indonesia happened in 1997/1998 when they burned approximately 10 million hectares of Indonesian forest and caused the country 10 billion USD of damage (Ekayani et al., 2016). This episode affected the ecological equilibrium despite its economic impact, which was highlighted more boldly in the mass media. The forest fires and transboundary haze at that time also triggered the [ASEAN Agreement on Transboundary Haze Pollution \(2002\)](#), which sought to implement measures to prevent forest fires leading to haze (Forsyth, 2014). Despite the agreement, forest fires continue to occur annually, and in 2005 and 2013, high levels of air pollution were reported in Singapore and Malaysia. This ongoing issue demonstrates that transboundary haze is a global problem that requires academic discussions, including those from a linguistic perspective.

From a linguistic lens, the issue of transboundary haze is inextricably linked to public discourse, accessed in news media, that can mould our perception and behaviour toward the environment. Ecolinguistics offers a theoretical ground for discussing discourses and their relevance to environmental impacts. Ecolinguistics is a theory that examines the relationship between humans, the environment, and non-human species (Stibbe, 2015). It explores social cognition through discourse and uncovers stories and their implications, assessing their beneficial, ambivalent, or destructive nature. Ecolinguistics argues that the (re)production of certain language choices and structures in mass media showcases the most important information addressed to the readers. In this matter, mass media have the power to shape public perception, understanding, and attitude toward the transboundary haze. For instance, the erasure of corporate activities as big subjects that contribute to worsening forest fires is ecologically destructive.

News media are also responsible for influencing public policy and impacting the ecological equilibrium. This study argues that public discourse does not heavily involve the environment and non-human species in the discourse of transboundary haze, since research foregrounds economic and public policy impacts. Some studies suggested that the haze has affected ASEAN countries' economies. The estimated cost caused by the haze in the Indonesian economy was USD 16.1 billion (Fatimah et al., 2023; Quah et al., 2021; Uda et al., 2019; Wooster et al., 2018). The total cost of the haze in Singapore is estimated at 1.83 billion (Quah et al., 2021), and Malaysia's economic loss due to the transboundary haze is estimated at \$1.1 million to \$1.7 million (Othman et al., 2014). Those studies have shown that transboundary haze has severe economic impacts. Nonetheless, providing new insight into studying transboundary haze from an ecological lens is essential.

Recent studies on transboundary haze in Indonesia and its surrounding countries have mainly focused on newspaper discourses and public sentiment from Twitter (Asmara et al., 2020; Du et al., 2024; Ekayani et al., 2016; Forsyth, 2014; Hasfi et al., 2021; Rochyadi-Reetz et al., 2020; Varkkey, 2022). However, some of those studies only included a small amount of data and conducted the analysis manually using a content analysis approach. Some research has utilised critical discourse analysis (Asmara et al., 2020; Rochyadi-Reetz et al., 2020), but there is a need for an in-depth discussion of the linguistic evidence within these analyses. This study incorporates big data to address this gap by constructing a specialised corpus from four Indonesian and Malaysian news media sources. The linguistic analysis also uses a corpus tool to provide empirical evidence on the most salient patterns in news discourse. Moreover, the ecological interpretation is also offered. In addition, we compare the discourse of transboundary haze in Indonesia and Malaysia.

Based on the above background, this study addresses the following research questions:

1. What themes are salient in Indonesian and Malaysian news media in broadcasting transboundary haze news?
2. How does ecolinguistics provide an ecological perspective of the themes represented in the news media?

This comparative study is expected to provide a more thorough analysis of transboundary haze discourse. Hence, this study aims to provide a deeper understanding of the debates of transboundary haze by examining them through the corpus-assisted ecolinguistics framework.

2. LITERATURE REVIEW

2.1 Corpus-Assisted Discourse Studies (CADS)

Corpus-assisted discourse studies involve two areas related to linguistics: corpus linguistics and discourse analysis. CADS is a methodological vehicle used to examine discourse by involving big data. It relies on empirical evidence from statistics of particular linguistic features and discourse patterns. Basically, corpus linguistics (CL) is not a branch of linguistics, such as semantics or syntax. Still, it is a method to study language based on real-life language use (McEnery & Hardie, 2011). Critical discourse studies help analyse the bias of language patterns in representing how language is exercised to express power, dominance, and social imbalance. For example, Suhandano et al. (2023) prove that the juxtaposition between growth and sustainability in Indonesia's capital city relocation legal documents articulates an ecomodernist viewpoint rather than an ecological one.

CADS is an integrated approach that combines the advantages of both quantitative and qualitative discourse analysis. In studying mass media, CADS not only provides a description and quantification of media presentations but also uncovers the dynamics in media production and the cognitive, social, and political factors that shape discourses (Moon, 2023). Language in public discourse is one of the interests of CADS since public perceptions, responses, and behaviours are driven by discourse (van Dijk, 2006). Since transboundary haze has been happening for more than four decades, reports on the issue are prevalent in the mass media. Hence, it is essential to investigate how the media drives the discourse based on its linguistic choice. Mass media are only sometimes neutral, and their language is ideologically selected since it holds power over systematic tendencies in news reporting (Fairclough, 1992).

CADS is a framework that utilizes corpora and corpus processes to reveal linguistic patterns that facilitate our comprehension of how language is employed in discourse construction (Baker, 2023). Some previous studies exemplified practical analytical tools from CL, including word lists, keywords, collocations, and concordances. While word lists show the most frequent words used in a corpus, keywords demonstrate the specificity of a corpus obtained by comparing a corpus to a more general one. In addition, collocations show how a word co-occurs with its surrounding words, and concordances show how a word is used in context. Aligning with the principles of CDA, this study utilizes CL to 1) analyse linguistic patterns based on the keywords

and collocations, 2) describe how the language in a discourse is used in the context by concordances, and 3) assess the discourse based on the concept of media discourse and ecological paradigm (Al Fajri et al., 2023; Baker & McEnery, 2015; Poole, 2022).

2.2 Ecolinguistics

While CADS helps identify language patterns in big data and how they articulate discourse construction, ecolinguistics performs as a theoretical framework to examine how language interacts with its biological, sociological, and ideological dimensions (Bang & Trampe, 2014; do Couto, 2014). In CADS, ecolinguistics is essential in identifying the asymmetrical relations that affect humans, other organisms, or non-human species, and the environment as parts of an ecosystem. Stibbe (2014) emphasises that the objects of ecolinguistics are not restricted to ecological discourse, such as green advertising and conservation texts. Stibbe (2015) introduces the term 'stories' to refer to the social cognition accessed through, for example, discourse, frames, and metaphors. Those stories consist of particular language patterns that lead to our understanding of the world. It examines any kind of discourse, such as neoclassical economics. Ecological criticism aims to uncover 'stories' and their implications, such as whether the discourse is beneficial, ambivalent, or destructive.

This study adopts the stories of salience and erasure in examining the transboundary haze discourse. Salience is defined as a cognitive vehicle to project an area of life as important or worthy of attention, demonstrated by a linguistic or visual representation through concrete, specific, and vivid depictions (Stibbe, 2015). In mass media discourse, concrete and specific lexical items are shown by the repetition of high-frequency keywords that are constructed as the foregrounding theme to attract public attention. The use of individualisation through naming articulates the unique and irreplaceable entities, in contrast to homogenisation that distinguishes individuals of a larger group or mass. Erasure, as opposed to salience, is a deliberate approach used to signify that something is being deliberately disregarded, marginalised, or not given attention within a discourse (Stibbe, 2015). The use of exclusion or marginalisation is an example of a linguistic strategy that eliminates particular social actors as part of a discourse. Suhandano et al. (2023) exemplify the erasure of non-human species in the discourse of Indonesia's capital city relocation. The use of nominalisation and passivisation is an example of the strategy employed in erasure.

An ecological philosophy, such as deep ecology, cornucopianism, ecofeminism, or social ecology, determines the beneficial, ambivalent, or destructive discourse. Deep ecology advocates preserving nature based on its inherent value, regardless of its usefulness to humans. It adopts an ecocentric perspective and proposes a transformative change in our mindset and behaviour to address the ecological crisis (Haukeland, 2023; Næss et al., 2008). Hence, it argues that public discourse, including transboundary haze, should encompass issues of environment or nature since it not only performs as an instrumental value but also provides us with a place and 'home' for cultural flourishing, community health, and personal self-realisation (Næss et al., 2008). Those studies outline a critical role for considering ecology in constructing our viewpoint and behaviour toward the environment.

2.3 Previous Studies on Transboundary Haze Discourse

Several studies have been conducted on the transboundary haze in media discourse in Indonesia and its surrounding countries. Rochyadi-Reetz et al. (2020) investigated the news frames related to transboundary haze in Indonesia, Malaysia, and Singapore. The analysis identified three significant frames: 1) the crisis frame, 2) immediate actions, and 3) regular problem frames that dominate the discourse, other than providing information about the haze's causes and solutions. Another study by Asmara et al. (2020) investigated Indonesian and Malaysian mass media, specifically Detik.com and Malaysiakini.com, and demonstrated how the Malaysian government condemned Indonesia as the cause of the problems. Meanwhile, the news constructed by Malaysiakini.com mainly discussed the urge of the Malaysian government to help

Indonesia solve the problems. It said that they have never blamed Indonesia for all the haze problems. Both studies employed the critical discourse study method, but the discussion of empirical linguistic evidence was lacking in the analysis.

Another study related to transboundary haze was on tropical peatland discourse in Malaysian mass media by [Padfield et al. \(2023\)](#). The research examined 1,359 articles from News Straits Times, The Star, Borneo Post, and Malaysiakini.com from 1995 to 2018. The analysis found that peatland was framed as development, conservation/protection, sustainable development, and fire/haze. In addition, another research related to the current study was conducted by [Ekayani et al. \(2016\)](#). It investigated the role of scientists in forest fire media discourse. By comparing global and Indonesian mass media, the research employed content analysis and interviews with the stakeholders. Findings revealed that both international and national news media did not recognise science as the most salient speaking actor. While global media captured the cause of forest fires as ‘accidental’, the national media projected the cause as ‘intentional’.

In a more comprehensive analysis, [Forsyth \(2014\)](#) compared the transboundary haze in Indonesia, Singapore, and Malaysia from mass media published in 1997, 2005, and 2013. From the content analysis of 2,231 articles, the study found that the discourse of haze was dynamically presented in each country. The discussion shifted from the potential health and economic impacts that resulted partially naturally from El Niño, including droughts, towards the criticism of Indonesia for not adhering to the [ASEAN Agreement on Transboundary Haze Pollution \(2002\)](#). The research also found criticism towards Singaporean and Malaysian companies’ investing in palm oil plantations. It also depicted the low representation of biodiversity loss linked to haze. Other related studies were conducted on social media, such as Twitter, to examine public sentiment ([Du et al., 2024](#); [Hasfi et al., 2021](#)). The analysis showcased the following public sentiments: the neglect of peatland fires, health risks, and toxic haze, as well as the psychosocial and geopolitical tensions throughout the ASEAN countries.

Based on the aforementioned studies, it can be concluded that transboundary haze, as an example of an environmental issue, is a dynamic phenomenon whose representation in mass media is heavily influenced by its social context. Mass media, as the representation of how an environmental issue is presented to the public, take an important role in shaping readers’ perspectives and attitudes toward the environment. In general, those studies agree that transboundary haze impacts ASEAN countries’ economies, politics, and ecology. The diverse themes found in varied mass media articulate that transboundary haze still provides a vast opportunity for discourse analysts. The lack of an ecological perspective in discussing transboundary haze triggers the present study to provide a novel discussion in the area of environmental issues.

3. METHODS

3.1 Research Design

This corpus-based ecolinguistics research stems from the role of mass media’s language patterns in framing particular themes for the public. The continuous frames are potent tools to shape the public’s perceptions, opinions, and behaviour toward the environment. The corpus-assisted ecolinguistics is the development of corpus-assisted discourse studies that rely upon the principle of ecological philosophy ([Poole, 2022](#)). It concerns the “life-sustaining interactions of humans, other species, and the physical environment” ([Poole & Micalay-Hurtado, 2022, p. 374](#)). The commonality between CDA and ecolinguistics lies in their shared framework, methods, and overarching goal of promoting justice and equality ([Stibbe, 2014](#)). However, ecolinguistics goes further by focusing on the discourse that creates or perpetuates narratives where non-human entities and the environment are portrayed as voiceless and oppressed actors within the ecosystem ([Poole & Micalay-Hurtado, 2022](#)). By surveying recent publications on ecolinguistics, [Steffensen \(2024\)](#) figures out that ecolinguistics focuses on language use and bioecology within human-

environment interactions. Therefore, this study contends that while discussing transboundary haze, it is essential to consider not only the human participants and their economic interests, but also to provide further consideration to the portrayal of the environment in the matter. In other words, this study adopts ecolinguistics as the main framework to interpret the role of language in mass media in constructing public perception of transboundary haze. Moreover, we argue that the salient linguistic choice represented in mass media is responsible for our perception and behaviour towards the environment.

3.2 Data Source and Data Collection

This corpus-based study collected transboundary haze English news data in Indonesian and Malaysian media. Two prominent media outlets from each country were examined: The Jakarta Post and Antara from the Indonesian media, and New Straits Times and Malay Mail from the Malaysian media. They were selected based on their popularity in Indonesian and Malaysian societies, without deliberately comparing their ideologies. Those news media provide the highest number of articles on transboundary haze compared to other English news media. In order to collect the data, we manually used Bootcat to crawl the data from Indonesian news URLs. Bootcat provides a tool to create specialised collections of texts and terminologies from the internet (Baroni & Bernardini, 2004). Furthermore, we employed Python to retrieve the articles from Malaysian news sources from 2015 to 2024. Python is a programming language that crawls data with a fast, efficient, and intuitive set (Keller et al., 2020). The time duration used for collecting the Malaysian news articles was determined to achieve similar numbers of words as the Indonesian media. However, in the subsequent analysis, we used relative frequency to compare the specific words in the two corpora. We limited the data by applying restrictions to the following keywords: transboundary haze, haze, and forest fires. The article data source was identified by abbreviating the following codes: Country-Media-Month-Year. For example, I-An-Jun-2020 refers to an article published by Indonesian media, Antara, in June 2020, and M-NST-Aug-2021 refers to Malaysian media, New Straits Times, in August 2021. Table 1 shows the data acquired from the selected media source.

Table 1. Summary of the Indonesian and Malaysian News Media (IMNM) Corpus.

Indonesian Media			Malaysian Media		
Newspapers	Articles	Words	Newspapers	Articles	Words
The Jakarta Post	232	134,208	New Straits Times	394	122,823
Antara	569	254,884	Malay Mail	769	257,443
Total Number	801	389,092	Total Number	1,163	380,226

3.3 Data Analysis

Sketch Engine was used to analyse the data. Sketch Engine is an online corpus tool that offers valuable linguistic analysis to capture the linguistic patterns of the collected data. Three main corpus analytical works were applied to the analysis: keywords, word sketch, and concordances. Keywords were generated by comparing the IMNM corpus to a reference corpus, enTenTen21, containing more than 52 million words (Kilgarriff et al., 2014). To measure the keywords, this study relied on the logDice score to prove the keyness score of a word that characterises the focus corpus. In determining the semantic themes of the keywords, the study limited the analysis to the first hundred keywords. The keywords were semantically categorised into several themes related to broadcasting the transboundary haze issue. The analysis was conducted manually by referring to past studies (Forsyth, 2014; Rochyadi-Reetz et al., 2020).

Next, the data underwent a collocation analysis. The study restricted the collocation significance based on logDice score, a standardised metric that operates on a scale with a set upper limit of 14 (Gablasova et al., 2017; Rychlý, 2008). Frankenberg-Garcia et al. (2019) discovered

that a logDice score cutoff of 5 or higher effectively recognises lexical collocations. Hence, this study used the logDice measure with a minimum score of 5. Selecting these grammatical realisations helps identify the salience strategy involved in the discourse. The collocation analysis focused on the word by using the word sketch feature. Word sketch enables analysis of the collocations conducted based on specific grammatical relations, such as subjects of the verb haze, modifiers of haze, and nouns modified by haze. To ensure contextual accuracy, concordance analysis was administered where the word haze co-occurs with particular frames. In addition, the concordance analysis relies on the qualitative interpretation based on Stibbe's ecolinguistics concept of erasure and salience.

4. RESULTS

4.1 Salient Themes of Indonesian and Malaysian Media on Transboundary Haze

This study addresses the themes of transboundary haze news articles in Indonesian and Malaysian mass media. To obtain the themes, we examined the first 100 keywords of each newspaper and checked the concordances of each keyword where it is used in the news articles. The theme comparison relies on the relative frequency instead of the raw frequency. Relative frequency was obtained by calculating the raw frequency of the corpus that appears per million words. The relative frequency provides a reliable measurement for comparing corpora with different sizes. Detailed information on the keywords, raw frequency, and relative frequency is provided in Appendix 1.

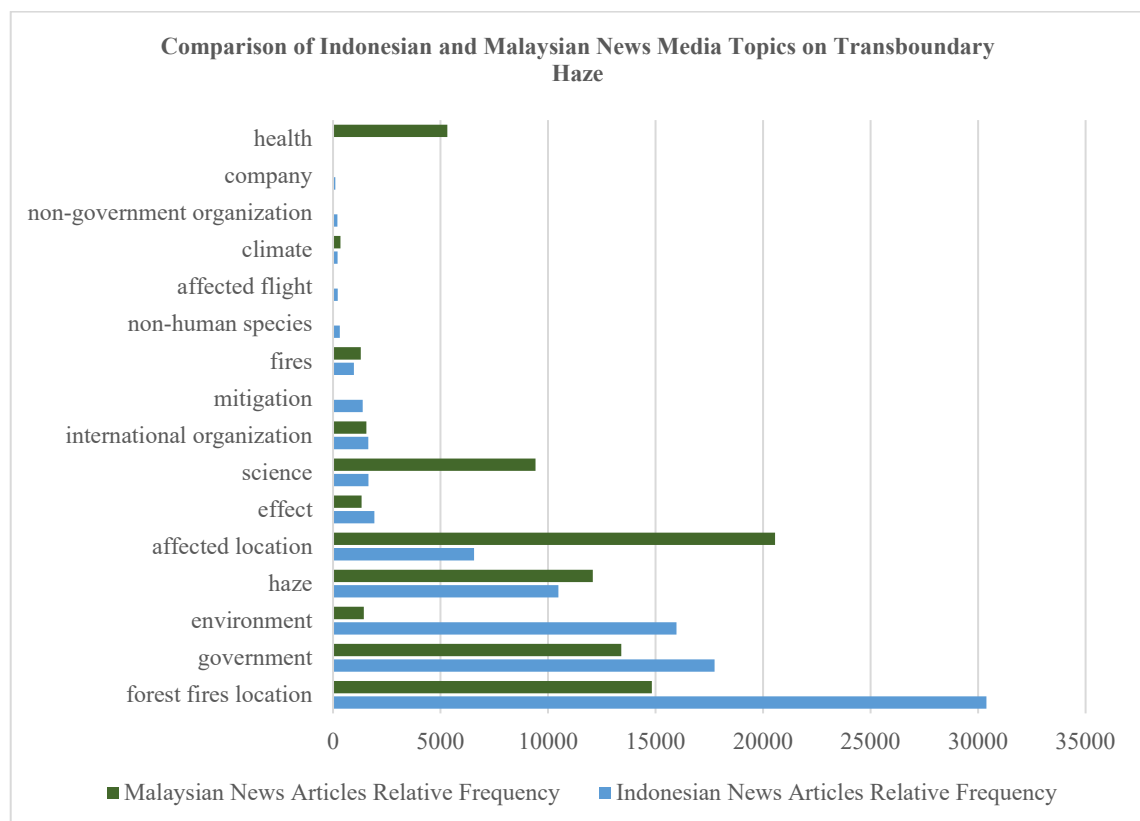


Figure 1. Comparison of Indonesian and Malaysian news media themes on transboundary haze.

Figure 1 demonstrates the themes employed by Indonesian and Malaysian news media in broadcasting news about transboundary haze. It shows that Indonesian mass media foregrounds the issue of forest fire location, while Malaysian media pays more attention to the affected

location. These findings also align with the theme of haze, which appears more frequently in Malaysian news media than in Indonesian news. Two notable themes, science and health, are more prevalent in Malaysian media than in Indonesian media. It is important to note that the word health was not captured as a keyword in the Indonesian news. Conversely, Indonesian media broadcasts haze as an environmental issue more often than Malaysian mass media. Similar themes were found in both countries including government, effects, international organisations, fires, and climate. On the other hand, the typical themes from Indonesian mass media are non-human species, affected flight, mitigation, and non-government organisation.

Table 2 summarises the themes and corresponding keywords captured in news media from Indonesia and Malaysia.

Table 2. List of themes and keywords in Indonesian and Malaysian news.

Themes	Indonesian News Media Keywords	Malaysian News Media Keywords
Fire's locations	Riau, Kalimantan, Sumatra, Pekanbaru, Jambi, Dumai, Hotspot, Rokan Hilir, Siak, Pelalawan, Indragiri, Palembang, Bengkalis, Kampar, Ogan Ilir, Aceh, Pontianak, Meranti, Komering, Belitung, Lampung, Bangka, Barito, Bengkulu, Hulu Sungai Musi	Kalimantan, Kuala Langat, Selangor, Sumatra, Johor, Riau, Pahang, Indonesia, Sabar, Kuala Baram, Borneo, Jambi, Rompin
Affected locations	Palangka Raya, Sultan Syarif Kasim II Airport, Sub-District Kotawaringin, Musi Banyuasin, Batam, Malaysia, Sampit, Ketapang, Singapore, Kuantan Singingi, Kuala Lumpur	Sarawak, Putrajaya, Kuala Langat, Klang, Sri Aman, Negeri Sembilan, Samarahan, Johan Setia, Melaka, Nilai, Cheras, Batu Pahat, Petaling Jaya, Shah Alam, Perak, Seremban, Batu Muda, Penang, Banting, Balok Baru, Bukit Rambai, Seberang Jaya, Ipoh, Terengganu, Kota Kinabalu, Pasir Gudang, Sibu, Seri Manjung, Miri, Sarikei, Alor Gajah, Alor Setar, Seberang Perai, Peninsular, Kedah, Kelantan, Malacca, Bandaraya, Kampung STC, Kampung Air, Kampung Kual, Balok Baru, Towel, Bintulu, Kinabalu, Tangkak
Government	BNPB, Joko Widodo, BMKG, BRG, Siti Nurbaya Bakar, Jusuf Kalla, Bpbd, Indonesia, Sutopo Purwo Nugroho, Susilo Bambang Yudhoyono, Syamsul Maarif, Tni, Agus Wibowo, Prihadi Agus Irianto, Zulkifli Hasan, Luhut Pandjaitan	Datuk Seri, Wan Junaidi Tuanku Jaafar, Malaysian, Nik Nazmi, Joko Widodo, Indonesia, Siti Nurbaya Bakar, Mohd Nadzim, Mohd Ali, Mohd Hisham, Mohd Hanif, Yeo Bee Yin, Nadma
Environment	peatland, plantation, peat, forest, biosphere, deforestation, haze-free	peatland, peat
Haze	haze, transboundary, smog	haze, transboundary, smog
Effects	hectare, shroud	hazardous
Science	climatology, geophysics, meteorology	api (air pollutant index), pollutant, apims (air pollutant index management system), meteorological, categorise
International Organization	ASEAN, AATHP (asean agreement on trans-boundary haze pollution)	ASEAN, ASMC (asean specialised meteorological centre)
Mitigation	extinguish	
Fires	wildfire, slash-and-burn	hotspot, slash-and-burn
Non-human species	Sumatran tiger, Sumatran elephants, orangutan	
Affected flight	Garuda	
Climate	El Nino	El Nino
Non-government organization	WALHI	
Company	Sinar Mas	
Health		unhealthy

In addition to relying upon the keyword analysis, this study involves a collocation analysis to determine how 'haze' co-occurs with its surrounding words. By analysing grammatical

The word sketch provided in Figures 2 and 3 shows that collocation patterns of 'haze' in both countries exhibit more similarities than differences. The visualisation above shows how 'haze' collocates with its surrounding words based on the grammatical realisation specified earlier; for instance, green to represent nouns that are modified by 'haze'. The larger the collocate's font, the higher its logDice score. In other words, the larger the words, the closer the relation of the collocations. From the visualisation, transboundary haze in Indonesian media is presented as a 'disaster', 'problem', 'pollution', and 'crisis'. It is also located as an agent that 'affect', 'shroud', and 'cause annual smoky', 'hazardous effects'. However, the projection of transboundary haze as pollution and disaster is heavily influenced by the salient participant: the government. Similarly, Malaysian mass media portray transboundary haze as a 'situation', 'problem', 'pollution', 'crisis', and 'condition that cause', 'affect', and 'worsen air pollution' index.

Extract (1) is an example of an extract from Indonesian mass media that portrays transboundary haze.

- (1) "Now the National Agency of Disaster Mitigation (**BNPB**) is working to tackle hotspots by using cloud-seeding," Environmental Affairs Minister **Gusti Muhammad Hatta** said in Jakarta recently. (I-An-Aug-2011)

Extract (1) shows the statement by the Indonesian Minister of Environmental Affairs, Gusti Muhammad Hatta, 2009-2011. The minister emphasised the role of the National Agency of Disaster Mitigation (*Badan Nasional Penanggulangan Bencana* or BNPB) in mitigating the fire location. The extract identifies two social actors: BNPB and Gusti Muhammad Hatta, the Minister of Environmental Affairs. Both social actors appear as the themes and the collocates of the word 'haze'.

Referring to [Stibbe's \(2014\)](#) concept of salience, this study argues that Indonesian mass media involves both individualisation and homogenisation. The homogenisation refers to governmental organisations, such as BPBD (*Badan Penanggulangan Bencana Daerah*, or 'The Regional Disaster Management Agency'), BMKG (*Badan Meteorologi, Klimatologi, dan Geofisika*, or 'The Meteorology, Climatology, and Geophysics Agency'), and BRG (*Badan Restorasi Gambut*, or 'Peatland Restoration Agency'). By the homogenisation strategy to foreground governmental agencies, the Indonesian government has identified fires and transboundary haze as disasters. The news media pay more attention to mitigation efforts, and this is also supported by statistical data shown in Figure 1, depicting the fire location as the most prevalent theme in the Indonesian media. In addition, BPNB is also portrayed as an agent that conducts the following actions: 'mitigate', 'coordinate', 'tackle', 'report', 'record', 'confirm', and 'inform'.

Other than governmental organisations, Indonesian media include the other two important homogenisation features: ASEAN and WALHI (*Wahana Lingkungan Hidup Indonesia*, or 'The Indonesian Forum for Environment'). WALHI is Indonesia's largest and oldest non-governmental environmental advocacy organisation, founded in 1980. WALHI is prevalent in Indonesian mass media as an agent that actively criticises the Indonesian government regarding the government's attempt to solve the forest fires issue. Some verb collocates of WALHI are 'criticise', 'urge', 'command', and 'remark'. However, the lower frequency of criticism toward the government in mitigating forest fires emphasises transboundary haze as a disaster. It is also empirically shown by the haze collocates, such as peatland fires and plantation fires, that conceal the land opening conducted by Indonesian private oil companies.

Similar to Indonesian media, Malaysian mass media also include governmental organisations in broadcasting news about transboundary haze, but at a lower frequency compared to Indonesian media. Malaysian mass media uses an individualisation strategy by mentioning specific names associated with the government, as exemplified in Extract 2.

- (2) **Wan Junaidi** said the incidents involved private land and estates where open burning was carried out contributed to **air pollution and haze**. (M-MM-Apr-2016)

The excerpt in (2) demonstrates the individualisation strategy by mentioning the proper name Wan Junaidi, who was the Minister of Human Resources and Environment Ministry from 2015 to 2018. His statement criticises air pollution and haze due to the open burning by private land estates. In other words, Malaysian air pollution is heavily related to Indonesian forest fires that impact hazardous pollution. It is empirically proven by the fire locations mentioned by Malaysian mass media that mostly refer to Indonesia and its regions. In relation to the health theme, some other phrases that collocate with 'haze' are 'pollution levels spiked', 'respiratory illness', 'very unhealthy pollution level', 'suffocating air pollution', 'severe air pollution', 'hazardous air pollution', and 'unhealthy air pollution index'. The adjectives attached to these noun phrases show that Malaysian mass media consider health and pollution index as more essential themes than the government's mitigation. It is also evidenced by the absence of keywords referring to mitigation in the Malaysian mass media.

Indonesian and Malaysian mass media include the global organisation, ASEAN, in portraying news on transboundary haze. Below are some extracts from the corpus.

- (3) The opportunity is also open for Indonesia to become an **ASEAN** Center that could benefit optimally from transfer of knowledge and technology and researches to minimise forest fires, educate and promote public awareness through **ASEAN cooperation** and with **international assistance** towards prevention, mitigation and control of forest fires. (I-An-Jan-2011)
- (4) On Wednesday, Nik Nazmi sent a letter to Indonesia **to expedite the ASEAN Agreement** on Transboundary Haze Pollution. (M-MM-Oct-2023)

The employment of ASEAN in broadcasting transboundary haze is a homogenisation strategy calling for actions and responsibility by ASEAN members. Even though fire locations are mostly found in Indonesia, the global impacts on health, economics, and diplomacy require ASEAN's attention. From extract (3), it is notable that Indonesian mass media portray transboundary haze as an opportunity to transfer knowledge and technology to minimise forest fires. On the other hand, as seen by the demand to accelerate the implementation of the ASEAN Agreement on Transboundary Haze Pollution, Malaysian mass media emphasises ASEAN's necessity and shared accountability in tackling transboundary haze. This indicates that Malaysian mass media underlines the necessity for prompt and coordinated regional responses, reflecting a more immediate and action-oriented perspective.

In examining the role of ASEAN as a global organisation in the transboundary haze discourse, it is clear that the mass media in Malaysia and Indonesia use specific verbs to structure their narratives. Verbs like 'cause', 'produce', 'trigger', 'blame', 'overcome', 'say', and 'tackle' are frequently utilised in Indonesian news reports to explain the causes and effects of forest fires. These verbs highlight the technical and environmental problems that require resolution. Conversely, verbs like 'worsen', 'expect', 'blow', 'say', 'experience', and 'diminish' are used in Malaysian media. These verbs intensify the urgency of the situation and demand that ASEAN respond in a more coordinated manner. While both narratives agree that ASEAN involvement is essential, they differ in how much emphasis they place on it. Malaysian media emphasises prompt accountability and action to successfully rectify the problem, while Indonesian media concentrates on long-term remedies and capacity building.

5. DISCUSSION

This study stems from an ecolinguistics viewpoint that examines transboundary haze, a global issue that affects the ecosystem. Ecolinguistics addresses ecological philosophy that specifies whether a discourse is beneficial, ambivalent, or destructive. The principles of ecological philosophies, such as deep ecology (Næss et al., 2008), support the preservation of nature due to its inherent value and promote an ecocentric viewpoint. This approach emphasises the importance of including environmental issues in public discourse. It acknowledges nature's complex roles in promoting cultural flourishing, communal health, and personal self-realisation. Stibbe (2015)

asserts that discourse is beneficial when it actively encourages ecological equilibrium, in contrast to the destructive discourse that promotes massive consumption and anthropocentric viewpoint that locates humans as the environment's centre. In addition, the ambivalent discourse acknowledges the environment as an essential part of the ecosystem but does not actively promote self-realisation to construct social cognition about ecological sustainability/equilibrium.

The study found that Indonesian and Malaysian mass media share similarities and differences in portraying transboundary haze. One unanticipated finding was that health-related themes were discussed extensively in Malaysian mass media, emphasising the transboundary hazes' role as a source of hazardous air pollution and potential health danger. This finding contradicts the previous study by [Asmara et al. \(2020\)](#), which found that the Malaysian government condemned Indonesia as the cause of transboundary haze. Instead, Malaysian news media intend to pay more attention to health issues. On the other hand, the Indonesian mass media paid little attention to health issues. This divergent focus on health highlights the two countries' differing interests and points of view when reporting the transboundary haze.

Based on the keywords, word sketches, and salience involved, the study's findings are consistent with those of [Rochyadi-Reetz et al. \(2020\)](#) regarding the immediate actions portrayed in news media frames of Indonesia, Malaysia, and Singapore. The noun keywords of mitigation are apparent through the word *ASEAN*, although the verbs associated with mitigation are lacking. Even though no keywords pertaining to mitigation activities are identified in Malaysian media, according to the first 100 most frequent keywords shown in Table 2, both Indonesian and Malaysian media outlets recognise ASEAN as a crucial entity in addressing fires and transboundary haze. Indonesian mass media portray the country as a participant in fostering ASEAN cooperation, and Malaysian mass media tend to urge Indonesia's direct response and mitigation through ASEAN. The study also found no 'intentional' frame of transboundary haze, as [Ekayani et al. \(2016\)](#) previously found.

This study figured out that both Indonesian and Malaysian media reveal transboundary haze as a scientific phenomenon. It is empirically shown by including terms such as API (Air Pollution Index), pollutant, and APIMS (Air Pollutant Index Management System). Although, these results differ from some published studies ([Ekayani et al., 2016](#); [Forsyth, 2014](#)). They are consistent with the economic impacts of transboundary haze as both accidental and intentional phenomena. However, the scientific keywords in Indonesian mass media refer to the governmental organisation responsible for the mitigation actions: the Meteorology, Climatology, and Geophysical Agency (*BMKG*). The agency is included in the news media to report the fire locations found in diverse places in Indonesia. Therefore, the scientific terms climatology, meteorology, and geophysical do not refer to scientific phenomena associated with transboundary haze but to the agency that reports the issue. Nonetheless, this interpretation cannot be applied in Malaysian news media since they included scientific terms about the air pollution index, calling for public attention to the negative impacts of transboundary haze. In accordance with the present result, previous studies on Twitter also identified public sentiment about the health risks and toxic haze of the transboundary haze ([Du et al., 2024](#); [Hasfi et al., 2021](#)).

Following the present results, previous studies have demonstrated that transboundary haze was framed in terms of crisis, immediate actions, and regular problems ([Rochyadi-Reetz et al., 2020](#)). This study supports those findings by showing that Indonesian and Malaysian mass media tend to depict the haze as a disaster, problem, pollution, crisis, situation, and condition that cause, affect, and worsen the air pollution index. These frames articulate immediate actions by the government, represented in the Indonesian mass media by the keywords of Joko Widodo, and other governmental responsible agencies such as Sutopo Purwo Nugroho (the head of *BMKG*), Susilo Bambang Yudhoyono (the former president of Indonesia), Syamsul Maarif (the head of BNPB), Prihadi Agus Irianto (the head of the Riau Haze Disaster Response Task Force), Zulkifli Hasan (Trade Minister), and Luhut Pandjaitan (Coordinating Minister for Political, Legal and Security Affairs). In ecolinguistics, the inclusion of proper names articulates the salience strategy selected by mass media to emphasise the importance of individualisation and personalisation ([Stibbe, 2015](#)). The salience of individualisation and personalisation underscores Indonesian mass media's focus on the mitigation directed by the government.

On the other hand, Malaysian mass media tend to depict both Indonesian and Malaysian governments as responsible for immediate action by mentioning Wan Junaidi Tuanku Jaafar, Nik Nazmi, Joko Widodo, and Siti Nurbaya Bakar. This inclusion of Indonesian leaders in Malaysian media articulates that Malaysia urges direct mitigation by both countries. Since transboundary haze has caused air pollution, shown by an unhealthy index, Malaysian media calls for collective actions by both governments and ASEAN's role in interfering with the mitigation. In addition, Malaysian media also consist of the affected locations in a higher frequency compared to that of Indonesian media. Nonetheless, Malaysian media underlines transboundary haze as a situation and incident, emphasising the regular phenomenon that Malaysians experience. This finding is similar to the previous study by [Asmara et al. \(2020\)](#) regarding the cause of transboundary haze. However, verbs to condemn Indonesia are absent in the present study. In general, hardly does any media emphasise the root causes of transboundary haze. Human and corporate activities that cause the haze remain absent.

Compared to a previous study by [Padfield et al. \(2023\)](#), both Indonesian and Malaysian media also include the discourse of peatland. While previously, peatland discourse is constructed as (sustainable) development, conservation/protection, and haze, the current study finds a slightly different finding. From the keywords denoting environment, Indonesian media involve peatland, deforestation, biosphere, and forest. The same category of those keywords articulates an ecologically beneficial discourse. The forest fires are portrayed as an environmental phenomenon due to deforestation that impacts the biosphere. Indirectly, Indonesian mass media blame human activities in land clearings and open burnings to fulfil their anthropocentric agenda by maximising production. In addition, Indonesian media also mention non-human species such as the Sumatran tiger, Sumatran elephants, and orangutan as participants that are affected by transboundary haze and forest fires. This strategy acknowledges non-human species as parts of our ecosystem. This ecocentric discourse is essential in constructing our perspective of transboundary haze that impacts not only humans but the environment as well as non-human species ([Stibbe, 2015](#)). Nonetheless, Malaysian mass media only include peatland and peat in environmental terms referring to fire location and cause.

By referring to the deep ecology philosophy, this study argues that both Indonesian and Malaysian mass media articulate an ambivalent discourse. The principles of acknowledging the environment and non-human species are evident in the corpora, as proven by the keywords of environment, non-human species, and health issues. Nonetheless, the direct involvement of the public, companies, and government as responsible actors as the causing participants is still concealed in the public discourse. In addition, the inclusion of El Nino as the cause of transboundary haze is destructive. As one of the salient keywords in the corpora, El Nino is staged as the responsible actor in transboundary haze and forest fires. The temperature rise that characterises El Nino is blamed as one of the factors causing transboundary haze. Nevertheless, land clearings and open burning by human and corporation activities remain absent in the corpus. This anthropocentric viewpoint is prevalent in both Indonesian and Malaysian mass media when broadcasting news of transboundary haze.

This study figures out that mass media play an important role in shaping public perceptions and assumptions ([Bohr, 2020](#); [Kramar, 2023](#)). Both Indonesian and Malaysian mass media reproduce collective knowledge on transboundary haze, which is an annual and natural phenomenon. The rooting causes of transboundary haze remain blurred in the news media. On the other hand, institutionalising transboundary haze as an ASEAN problem is prevalent in both Indonesian and Malaysian mass media. These findings affirm the role of mass media, particularly newspapers, to emphasise or downplay specific subjects or perspectives related to the environment ([Suhandano et al., 2024](#)). The discussion above reveals the salience of government and global agents as institutions responsible for mitigating transboundary haze. Referring to the concept of critical discourse studies, the reproduction of institutionalisation discourse of transboundary haze proves the collective cognition of both countries in discussing the issue. The human activities related to land exploitation and clearings are concealed in the mass media. As an important subject in society, mass media plays an essential role in perpetuating the dominant ideology that makes transboundary haze a disaster instead of a phenomenon due to human

activities. Hence, it can be concluded that the discourse of transboundary haze is inextricably linked to the necessity of industrialisation that dominates the country. This finding has significant implications for creating mass media communications about transboundary haze, a problem that affects both local and global communities. It is essential for readers to understand the factors contributing to this haze. Some of the issues arising from this finding are directly related to global environmental problems, including disasters that impact ecosystems and affect both human and non-human species, as well as the environment itself.

6. CONCLUSION

The present study was designed to determine the themes of Indonesian and Malaysian mass media in broadcasting news of transboundary haze. In addition, this study also provides an ecological evaluation of the discourse produced. The results of this study indicate that both Indonesian and Malaysian mass media shared similar linguistic strategies to frame transboundary haze, even though some theme differences are also available in the analysis. In general, both Indonesian and Malaysian mass media portray transboundary haze as a regular phenomenon, as shown by the keywords referring to fires and affected locations. This finding is also proven by the collocates of *haze* that locate the transboundary haze as a *situation* and *episode*. Both also involve the government, its organisations, and ASEAN as responsible actors in reporting and mitigating transboundary haze through individualisation by mentioning specific names to resolve it.

The theme differences to underline are found in the inclusion of mitigation and environment in Indonesian mass media and the highlight of health and scientific issues in Malaysian news media. Indonesian mass media highlights the governments' and their agencies' role in leading the national and global (ASEAN) actions to resolve the problem. In the keywords, the salience of governmental agencies articulates the government's responsibility in resolving the case. Conversely, other than portraying governmental actions, Malaysian mass media pay more attention to the health and pollution impacts due to transboundary haze. It highlights the necessity of resolving the haze since it impacts the air pollution index. Doing so indirectly situates transboundary haze as a crisis.

These findings suggest that Indonesian and Malaysian mass media generally articulate an ambivalent discourse. The mass media do not focus on the triggering factors that create transboundary haze. Instead, the media present transboundary haze as a disaster that happens annually. Even though environmental and scientific issues are found in the corpus, keywords referring to transboundary as a regular phenomenon are foregrounded in the data. The erasure of human and corporate activities also conceals the causes of transboundary haze in both media. Ecologically, it is destructive since land clearings for agricultural activities are accepted as the 'correct' activities to fulfil humans' needs. Mass media, as a public discourse, should broadcast more ecocentric news regarding the presence of the environment and non-human species as parts of the ecosystem. The generalisability of these results is subject to certain limitations. For instance, the initial analysis was focused on the most frequent keywords compared to a general corpus. Future research needs to examine the employment of salient verbs more closely to observe the actions carried out by the social actors. Enlarging the corpus size by including more newspapers from other neighbouring countries is also highly suggested to provide a more comprehensive analysis.

The empirical findings in this study provide a nuanced understanding of mass media discourse in broadcasting news about transboundary haze. This study demonstrates that ecolinguistics is a robust framework for examining environmental issues, particularly those associated with transboundary haze and forest fires. Furthermore, the integration of a corpus-based methodology within critical discourse studies provides empirical evidence on how mass media shapes public perceptions of transboundary haze. This research extends our knowledge of ecolinguistics as a dependable theoretical framework in investigating environmental discourses, specifically in mass media. By employing big data and corpus-based methods as contemporary

tools in linguistics, this study significantly enhances the discourse surrounding these critical environmental issues.

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APPENDIX

Table A1. Statistical information on the keywords.

Indonesian Media					Malaysian Media				
Item	Themes	Frequency (focus)	Relative frequency (focus)	Score	Item	Themes	Frequency (focus)	Relative frequency (focus)	Score
riau	forest fires location	2426	5250,8208	4496,575	haze	haze	4015	9142,99512	2051,86
kalimantan	forest fires location	1516	3281,22192	2300,458	sarawak	affected location	815	1855,92554	1039,43
sumatra	forest fires location	1805	3906,73169	1881,168	unhealthy	health	2022	4604,51709	849,528
pekanbaru	forest fires location	880	1904,66711	1843,35	kalimantan	forest fires location	513	1168,20837	819,48
haze	haze	3214	6956,36377	1561,189	putrajaya	affected location	398	906,32928	789,282
peatland	environment	729	1577,84351	968,289	kuala (langat)	forest fires location	1055	2402,45581	737,379
jambi	forest fires location	422	913,37445	852,409	transboundary	haze	433	986,03162	662,294
bnpb	government	402	870,08655	852,293	selangor	forest fires location	471	1072,56555	650,588
dumai	forest fires location	368	796,49713	785,86	klang	affected location	377	858,50787	648,967
hilir	forest fires location	342	740,2229	730,383	datuk	government	366	833,45856	566,754
transboundary	haze	443	958,82672	644,04	sumatra	forest fires location	494	1124,94141	542,024
siak	forest fires location	264	571,40015	562,15	(sri) aman	affected location	359	817,51813	507,917
rokan	forest fires location	254	549,75616	544,75	(negeri) sembilan	affected location	235	535,14417	482,931
jokowi	government	299	647,15393	542,14	samarahan	affected location	209	475,93674	472,776

Table A1 continued...

hotspot	forest fires location	1271	2750,94556	540,867	johor	forest fires location	341	776,52832	465,901
bmkg	government	255	551,92059	540,528	seri	government	278	633,06415	425,144
bengkalis	forest fires location	247	534,60541	532,141	peatland	environment	287	653,55902	401,435
pelalawan	forest fires location	223	482,65994	481,448	(johan) setia	affected location	176	400,78882	379,582
indragiri	forest fires location	216	467,50919	465,982	junaidi	government	162	368,9079	365,211
widodo	government	212	458,85162	388,249	melaka	affected location	192	437,22418	349,054
palembang	forest fires location	193	417,72812	379,249	petaling	affected location	183	416,72928	341,741
smog	haze	358	774,85321	354,015	nilai	affected location	154	350,69022	337,707
joko	government	194	419,89252	353,606	riau	forest fires location	170	387,12558	332,311
asean	international organization	549	1188,25256	315,755	cheras	affected location	150	341,58139	322,701
climatology	science	210	454,52283	312,08	batu (pahat)	affected location	176	400,78882	307,13
purwanto	government	140	303,01523	301,956	(petaling) jaya	affected location	250	569,30231	298,715
heru	government	146	316,00159	297,238	pahang	forest fires location	156	355,24463	298,698
indonesia	government	1882	4073,39038	277,43	malaysian	government	621	1414,14697	295,661
kampar	forest fires location	131	283,53568	275,478	asean	international organization	470	1070,28833	284,435
ilir	forest fires location	127	274,87808	265,013	api (air pollutant index)	science	2414	5497,18359	284,37
ogan	forest fires location	123	266,22052	257,524	(shah) alam	affected location	234	532,86694	283,623
bpbd	government	117	253,23415	251,603	perak	affected location	162	368,9079	279,633
geophysics	science	207	448,02963	245,266	seremban	affected location	131	298,31442	279,458
indonesian	government	773	1673,0769	243,872	nazmi	government	124	282,37393	279,257
sutopo	government	109	235,91899	233,339	(batu) muda	affected location	138	314,25488	279,192
aceh	forest fires location	169	365,78265	233,291	pollutant (air pollutant index)	science	674	1534,83899	278,407
extinguish	action	437	945,84033	233,103	indonesia	forest fires location	1781	4055,70947	276,226
pontianak	forest fires location	110	238,08339	228,321	negri (sembilan)	affected location	155	352,96744	275,353
yudhoyono	government	119	257,56293	224,049	widodo	government	140	318,8093	270,012
meranti	forest fires location	102	220,76823	215,063	(Asean Specialised Meteorological Centre) asmc	international organization	119	270,98788	266,794
meteorology	science	225	486,98874	214,68	malaysia	government	1459	3322,44849	259,458
nurbaya	government	93	201,28868	200,547	penang	affected location	238	541,97577	257,823
plantation	environment	872	1887,35193	199,767	banting	affected location	123	280,09674	255,616
(palangka) raya	affected location	136	294,35764	199,551	apims (Air Pollutant Index Management System)	science	110	250,49301	251,371
slash-and-burn	action	99	214,27504	198,466	indonesian	government	756	1721,57019	250,937
peat	environment	296	640,66077	196,501	(balok) baru	affected location	132	300,59161	243,697
maarif	government	91	196,95988	196,085	(bukit) rambai	affected location	106	241,38419	241,081
aathp (ASEAN Agreement on Trans-boundary Haze Pollution)	international organization	90	194,7955	195,637	seberang (jaya)	affected location	107	243,66139	237,807
siti	government	107	231,59019	194,539	ipoh	affected location	123	280,09674	232,724
bambang	government	100	216,43944	191,511	terengganu	affected location	118	268,71069	227,893
hectare	unit	577	1248,85559	185,488	nik (nazmi)	government	175	398,51163	225,211
syarif (Sultan Syarif Kasim II Airport)	affected location	80	173,15155	171,792	sabah	forest fires location	201	457,71906	223,389
walhi	organization	80	173,15155	171,511	kota (kinablu)	affected location	171	389,40277	217,5
sub-district	affected location	106	229,42581	170,867	pasir (gudang)	affected location	105	239,10696	212,369
tni	government	99	214,27504	165,393	gudang	affected location	96	218,61209	211,682
agus	government	111	240,24779	163,199	sibu	affected location	99	225,44371	209,616
anggoro	government	74	160,16519	160,787	joko	government	104	236,82976	199,809
hulu	forest fires location	188	406,90616	159,626	(seri) manjung	affected location	87	198,1172	197,215
nugroho	government	76	164,49397	158,887	(kuala) baram	forest fires location	90	204,94884	195,327
kotawaringin	affected location	73	158,00079	158,501	borneo	forest fires location	186	423,56091	194,591
komering	forest fires location	70	151,50761	151,761	bukit (rambai)	affected location	124	282,37393	193,55
palangka	affected location	69	149,34322	149,407	miri	affected location	262	596,62885	186,935
purwo	government	68	147,17882	146,514	nurbaya	government	82	186,73116	186,114
belitung	forest fires location	68	147,17882	144,105	hotspot	fires	412	938,21021	184,592
banyuasin	affected location	66	142,85004	143,382	sarikei	affected location	81	184,45395	183,972
batam	affected location	73	158,00079	141,51	peat	environment	257	585,2428	179,53
wildfire	fire	378	818,14111	139,049	(siti nurbaya) bakar	government	89	202,67162	178,332
lampung	forest fires location	68	147,17882	137,878	siti	government	92	209,50325	176,065

Table A1 continued...

uu	government	91	196,95988	135,86	alor (gajah, setar)	affected location	85	193,56279	170,543
garuda	affected flight	85	183,97353	135,206	meteorological	science	250	569,30231	169,328
kasim (Sultan Syarif Kasim II Airport)	affected location	70	151,50761	134,781	slash-and-burn	fires	79	179,89954	166,775
trans-boundary	haze	63	136,35684	128,966	mohd (nadzim, ali, hisham, hanif)	government	115	261,87906	162,589
bangka	forest fires location	62	134,19246	128,937	jaafar	government	77	175,34511	160,683
malaysia	affected location	761	1647,10413	128,666	(seberang) perai	affected location	72	163,95906	160,211
forestry	government	434	939,34717	127,981	yeo (bee yin)	government	103	234,55255	159,831
syamsul	government	59	127,69927	127,803	peninsular	affected location	121	275,54233	158,389
sampit	affected location	59	127,69927	127,429	kedah	affected location	81	184,45395	152,88
mitigation (BNPB)	government	482	1043,23816	120,205	negeri (sembilan)	affected location	77	175,34511	152,448
susilo	government	60	129,86366	119,021	smog	haze	146	332,47253	152,16
forest	environment	4025	8711,6875	117,895	kelantan	affected location	79	179,89954	151,653
wibowo	government	55	119,04169	117,841	malacca	affected location	97	220,8893	150,075
zulkifli	government	55	119,04169	114,121	nadma (National Disaster Management Agency)	government	65	148,0186	148,683
luhut	government	50	108,21972	107,726	kuantan	affected location	71	161,68185	148,475
ketapang	affected location	50	108,21972	107,709	muar	affected location	69	157,12744	148,368
brg (Badan Restorasi Gambut)	government	54	116,8773	106,116	nino	climate	132	300,59161	146,913
sumatran (tiger, elephants)	non-human species	58	125,53487	102,914	johan (setia)	affected location	174	396,23441	143,291
biosphere	environment	114	246,74097	101,946	jambi	forest fires location	67	152,57301	143,166
(Siti Nurbaya) bakar	government	53	114,71291	101,316	tuanku	government	65	148,0186	142,518
barito	forest fires location	46	99,56214	98,563	bandaraya (Melaka)	affected location	62	141,18697	141,067
(el) niño	climate	83	179,64473	97,178	categorise	science	132	300,59161	131,77
deforestation	environment	140	303,01523	95,21	wan	government	225	512,37207	129,43
bengkulu	forest fires location	44	95,23335	92,714	sumatera	forest fires location	59	134,35535	128,952
singapore	affected location	839	1815,92688	90,987	kampung (STC, air, kual)	affected location	67	152,57301	127,162
shroud	effect	170	367,94705	89,869	balok (baru)	affected location	55	125,24651	124,91
kuantan (Singingi)	affected location	44	95,23335	87,829	tawau	affected location	59	134,35535	124,809
(Jusuf) kalla	government	44	95,23335	86,938	kinabalu	affected location	72	163,95906	124,72
sinar (mas)	company	41	88,74017	85,391	rompin	forest fires location	55	125,24651	124,245
(hulu) sungai	forest fires location	48	103,89093	85,279	hazardous	effect	504	1147,7135	123,6
kuala	affected location	125	270,54932	83,311	bintulu	affected location	56	127,52372	123,254
orangutan	non-human species	64	138,52124	82,812	tangkak	affected location	53	120,69209	120,65