

Corpus-Assisted Frame Analysis of Climate Change Editorials in Indian English Language Newspapers

Lakshmi G. Reghunath* and Shahila Zafar

Department of English, Central University of Punjab, Bathinda – 151401, India
✉ lakshmigreghunath@gmail.com

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Abstract: Media reporting of climate change has long influenced public perception of the issue. The present study attempts to understand the media presentation of climate change in India by investigating the framing of climate change discourses in 30 editorials of prominent Indian English newspapers, *The Times of India*, *The Indian Express*, and *The Hindu*, with the help of corpus-assisted frame analysis using *Sketch Engine* software. The study utilised corpus techniques, like keyword and concordance analysis, along with open coding, to extract common “frames” that figure prominently in the selected newspapers. The results revealed that four major frames were employed by the newspapers: climate change as a worrisome reality that requires immediate attention; climate compensation and mitigation funds as contentious issues that require deliberation between developed and developing nations; India as an active participant in mitigation efforts; and climate crisis as a geopolitical issue that requires cooperation across the board. The analysis resulted in the conclusion that these newspapers displayed little climate scepticism, was sensitive to the economics of mitigative action, and were interested in India’s role in the conversations regarding climate change on the global stage.

Keywords: Climate change media; Climate communication; Concordance analysis; Corpus-assisted frame analysis.

Introduction

Climate change and related discourses have taken centre stage in international media circles since the turn of the millennium (Schäfer & Schlichting, 2014). The prevalence of the topic in global media spaces and the influence of said media on the psyche of the average audience member have led to increased scholarly attention on the relationship between media construction of ecological issues and the reception of climate change mitigation efforts among the general public (Carvalho, 2007; Moser, 2010; Nisbet, 2009). Even with the increased attention on climate change-related news around the world, climate change communication is a challenge for the scientific community because of

the heavily divided public opinion on the topic often influenced by the media (Moser, 2010).

Climate change, however, is a multi-faceted issue that goes beyond the degradation of the physical environment and has concrete geopolitical consequences in the form of habitat loss, global health and financial crises, as well as strained international relations (Hase et al., 2021; IPCC, 2023). While there has been widespread research on the representation of climate change media across the globe, most of them have also had the developed nations of the Global North as points of reference (Agin & Karlsson, 2021; Hase et al., 2021; Schäfer & Schlichting, 2014), making such research in the disproportionately affected vulnerable developing nations (IPCC, 2023) all the more important. Indian

*Corresponding Author

media discourses surrounding climate change have traditionally included a development angle, wherein economic development is pitted against the cost of mitigative action as well as a risk- responsibility angle, where a large part of the responsibility of climate change is attributed to developed countries (Billett, 2010; Mittal, 2012). Investigations into Indian media reportage of climate change in recent years have also revealed that there has been a shift in focus to look inward at domestic actions and what they mean for the country as well as the world (Jogesh, 2019; Thaker et al., 2017).

The current study attempts to analyse editorials related to climate change and sustainability issues in three major English language newspapers in India, *The Times of India*, *The Indian Express*, and *The Hindu*, during the year 2022, to understand the nature of new climate change discourse communicated through traditional print media. For this purpose, the study adopted a corpus-based methodology to perform a frame analysis of a compiled corpus of editorials from the web archives of the respective newspapers.

Literature Review

Media representations of climate change discourses have historically impacted the general public's responses to issues like global warming and sustainability (Carvalho, 2007; Moser, 2010; Nisbet, 2009; Weingart et al., 2000). Therefore, analysis of media coverage of climate change and its effect on the general public has emerged as a significant field of study in academic communities. Studies have dealt with the use of journalistic norms in climate change communication (Boykoff & Boykoff, 2004; Schäfer & O'Neill, 2017), the influence of ideologies and cultures on climate change coverage (Painter & Ashe, 2012), the ecological discourses prevalent in European and North American countries (Bevitori, 2011; Grundmann & Krishnamurthy, 2010; Grundmann & Scott, 2012) and more. However, many studies (Blicharska et al., 2017; Schäfer & Schlichting, 2014) have also indicated a clear Global North-South divide concerning research on climate change communication and policy setting, calling for more investigations on the relevant fields in the third world.

Studies concerning Indian climate change reportage (Jogesh, 2012; Mittal, 2012) have revealed that the Indian media often lack the scepticism of the Western, particularly North American press, in their reporting of climate change and that they often approach such issues of ecological significance with a sense of scientific certainty. Research from the earlier part of the 2010s

(Billett, 2010; Jogesh, 2012) on mainstream English language newspapers in India has shown that there has been an insistence on setting the climate change and global warming discourse along nationalistic lines, wherein India's position as a developing nation that has only begun the process of industrialisation was clearly highlighted against the developed countries of the West whose heavily industrialised economies made them the bigger carbon polluters historically. However, investigations on climate change communication in the country in recent times (Jogesh, 2019; Thaker et al., 2017) have revealed that there has been a discourse shift in the discussion of climate change in the Indian press from the risk and responsibility angle to a co-benefit angle where the country's development is perceived to go hand in hand with discussions of sustainability.

When it comes to methodologies used for analysis, over the years, multiple studies using triangulation methods that married critical discourse analysis and frame analysis with corpus tools and methods to analyse news discourse have dealt with issues of representation and the influence of media language on public perception (Baker et al., 2008; Baker & Levon, 2015; Partington, 2012, 2015). In a similar vein, research on ecological discourse from Europe and North America has successfully adopted corpus tools and methods to investigate the public perception of genetically modified crops (Augoustinos et al., 2009), the use of the term 'green' (Bevitori, 2011), media representations of global warming (Grundmann & Krishnamurthy, 2010), etc. In the context of India, while there have been a significant number of studies (Billett, 2010; Jogesh, 2019; Mittal, 2012; Thaker et al., 2017) using content and meta-analysis to examine climate change discourses in the country, a corpus-based discourse or frame analysis has not been employed as an approach to delve into the language of climate change communication.

Theoretical Approach and Methodology

The present study focusses on the specific use of frames as a means to communicate certain ideas on climate change in the selected newspapers. "Frames" here refer to the concept described by Lakoff in Frame Theory (2010), that is, means designed to bring certain aspects of a complex issue to the mind of an audience and thereby communicate a discourse. This investigation utilised editorials on climate change collected from three Indian English-language newspapers, *The Times of India*, *The Indian Express*, and *The Hindu*, in 2022. The compiled data comprised 8 pieces from *The Times of India*, 12 pieces from *The Indian Express* and 10 pieces

from *The Hindu*, all of which were collected from the web archives of the respective newspapers. The study adopted corpus tools to compile and analyse the data. A corpus is a collection of mostly digitally compiled real-life linguistic data. A general corpus is a corpus that includes millions of words of general text data from real-life language use, and a specialised corpus is a corpus of text data compiled for a particular purpose. Each corpus might contain multiple sub-corpora that are compilations of the text data based on specific categories within the general or specialised corpora (Baker & Ellice, 2011). Each editorial used in this study was cleaned using a plain text editor and compiled into a specialised corpus of about 13,407 words using *Sketch Engine*, a web software for compiling and analysing corpora.

In this study, the compiled specialised corpus named *Editorials 2020* was compared to a general English corpus, *English Web 2020 (enTenTen20)*, which contains about 38 billion words of common English across genres to generate a list of 100 multi-word key terms. Keywords or key terms are a list of terms that occur more frequently in a given specialised corpus as compared to a general reference corpus (Baker & Ellice, 2011). The list of 100 key terms was further cleaned to weed out repetitions, function words, proper nouns or other terms and phrases that are unrelated to the theme of climate change to arrive at 43 unique terms for study.

Furthermore, concordance analysis was carried out on the 43 relevant key terms to understand specific contexts for their occurrence in the text. The corpus-driven analysis of concordance data often results in the identification of repeated patterns of meaning surrounding a specific term that can reveal frames (Mahlberg, 2014). The repeated patterns of meaning in this instance were determined by the frequency of specific content words in the left and right contexts of the key terms selected for analysis. Finally, frames were determined with the use of open coding, as suggested by Touri & Koteyko (2015) from the data compiled using the analysis of key terms and their concordance lines.

Results and Discussion

The study included all editorials that appeared in the selected newspapers, *The Times of India*, *The Indian Express*, and *The Hindu*, in 2022. The maximum number of editorial pieces for each newspaper was collected during the month of November, indicating an extensive coverage of climate change-related topics during the Conference of the Parties of the United

Nations Framework Convention on Climate Change (COP27) held at Sharm El Sheikh, Egypt, in November 2022. The texts of each editorial collected from the web archives of the respective newspapers and compiled into the specialised corpus, *Editorials 2022*, were then compared against the general English corpus *English Web 2020 (enTenTen20)* on *Sketch Engine* to extract key terms along with their keyness values calculated using methods suggested by Kilgarrieff (2009). A ranked list of the top 43 key terms selected after the cleaning process for concordance analysis is presented in Table 1, along with their keyness scores. The extraction of keywords or key terms helps in statistically understanding the keyness in a body of text. Keyness in this context refers to “a quality of words may have in a given text or set of texts, suggesting that they are important” (Scott & Tribble, 2007). Since keyword extraction produces a list of terms that are relatively less frequent in a general corpus compared to a specialised corpus (Scott & Tribble, 2007), the extracted key terms can reveal words that can be representative of the frames that define the compiled text.

The key terms identified for their keyness in Table 1 are all terms specific to the focus corpus involved in communicating ideas associated with climate change. Therefore, the concordance lines of these 43 key terms are indicative of the topics discussed in the compiled set of editorials. In order to further understand the packets of information conveyed through these key terms, they were categorised into three separate semantic sets named “science”, “economy” and “politics” in Table 2 following the convention adopted by Touri & Koteyko (2015).

The first semantic category, as shown in Table 2, is “Science”, which includes terms like “*natural forest*”, “*forest cover*”, “*temperature rise*”, “*extreme weather event*”, etc. and means to categorise key terms related to the physical environment and the scientific effect of climate change. The second semantic category, “Economy”, includes terms that imply the financial aspects of the climate crisis, like “*climate compensation*”, “*compensation fund*”, “*determined contribution*”, etc. The third semantic category, here, includes terms related to the negotiations and mitigation efforts on climate change and is named “Politics”. This category includes terms like “*climate diplomat*”, “*Ukraine conflict*”, “*environmental crime*”, “*climate cooperation*”, etc. However, each semantic category proves to be less mutually exclusive as certain key terms seem to contain salience in multiple semantic categories like “*fossil fuel*” or “*climate action*”, which can appear

Table 1: Key terms

S.No.	Key Terms	Keyness Score	S. No.	Key Terms	Keyness Score
1	natural forest	472.975	23	groundwater extraction	188.174
2	forest cover	395.68	24	tangible outcome	185.275
3	climate compensation	390.557	25	conference of parties	184.822
4	IPCC report	321.892	26	water scarcity	184.329
5	green hydrogen	300.999	27	global body	184.262
6	environmental crime	293.841	28	climate disaster	180.435
7	compensation fund	286.134	29	flood management	177.705
8	rich country	282.119	30	climate action	177.572
9	climate diplomat	260.584	31	determined contribution	177.254
10	Ukraine conflict	254.706	32	groundwater recharge	175.422
11	climate ambition	253.069	33	strategy document	174.269
12	temperature rise	252.721	34	climate summit	170.581
13	climate crisis	243.925	35	framework convention on climate	153.998
14	pre-industrial level	231.542	36	summer temperature	151.8
15	rich nation	226.17	37	un climate	150.962
16	extreme weather event	219.408	38	fossil fuel	134.632
17	carbon sink	213.922	39	energy transition	131.563
18	warning system	205.416	40	climate-related assessment	131.031
19	loss in the forest cover	196.046	41	climate-compatible growth demand	131.031
20	climate cooperation	195.249	42	balancing energy use	131.031
21	weather event	195.096	43	funding commitment in climate change	131.031
22	rise in temperatures	192.383			

in all three semantic sets as they have significance to each category. The semantic categories, nonetheless, helped narrow down the process of concordance analysis and compare the concordance lines of key terms within a semantic set to find patterns that indicate specific frames across the compiled texts using open coding.

Subsequently, a datasheet was compiled to include concordance lines of key terms from each semantic set to further understand the contexts in which the key terms occur. For example, some of the concordance lines of key terms “*climate compensation*” and “*compensation fund*”, which fall under the semantic set “economy”, are shown in Figure 1 and Figure 2.

The concordance lines for the key terms above reveal a specific theme for the discussion ‘funding for mitigation efforts in developing countries’ in the selected newspapers with the lexical and syntactical choices like “*hard-to-implement*”, “*unlikely*”, “*tough*”,

“*not new*”, “*bigger challenge*” etc., surrounding the terms “*climate compensation*” and “*compensation fund*”. Compounding such findings with the results of concordance analysis of other key terms related to economy categorized under the same semantic set can lead to the frames of the compiled texts. In this particular example, the lexical choices made by the selected newspapers surrounding the key terms “*climate compensation*” and “*compensation fund*”, along with key terms like “*rich country*”, “*determined contribution*” etc., led to the identification of the frame “climate change compensation and mitigation funding as contentious.”

In this manner, the concordance lines of key terms under each semantic set were analysed and put through open coding, an inductive method of sorting through data by categorising concepts based on the properties of their occurrence, in order to arrive at frames as depicted in Table 3.

Table 2: Semantic categories of key terms

S.No.	Multi-word Key term	Semantic Category	S.No.	Multi-word Key term	Semantic Category
1	natural forest	Science	23	groundwater extraction	Science
2	forest cover	Science	24	tangible outcome	Politics, Science
3	climate compensation	Economy	25	conference of parties	Politics
4	IPCC report	Politics, Science	26	water scarcity	Science, Politics
5	green hydrogen	Science	27	global body	Politics
6	environmental crime	Politics	28	climate disaster	Science
7	compensation fund	Economy	29	flood management	Science
8	rich country	Economy, Politics	30	climate action	Politics, Science, Economy
9	climate diplomat	Politics	31	determined contribution	Economy
10	Ukraine conflict	Politics	32	groundwater recharge	Science
11	climate ambition	Politics, Science	33	strategy document	Politics, Science
12	temperature rise	Science	34	climate summit	Politics, Science, Economy
13	climate crisis	Science, Politics	35	framework convention on climate	Politics, Science, Economy
14	pre-industrial level	Politics, Economy	36	summer temperature	Science
15	rich nation	Economy	37	un climate	Politics, Science, Economy
16	extreme weather event	Science	38	fossil fuel	Politics, Science, Economy
17	carbon sink	Science	39	energy transition	Politics, Science, Economy
18	warning system	Science	40	climate-related assessment	Politics, Science
19	loss in the forest cover	Science, Politics	41	climate-compatible growth demand	Politics, Science, Economy
20	climate cooperation	Politics	42	balancing energy use	Science, Economy
21	weather event	Science	43	funding commitment in climate change	Science, Economy
22	rise in temperatures	Science			

- hydrogen and carbon capture are two of the most critical next steps. Finding the cash: Funding COP27's agreement on **climate compensation** & energy transition will be **tough** Tortuous negotiations at COP27 yielded an important breakthrough

- at COP27 yielded an important breakthrough – the agreement to set up a loss and damage fund, often referred to as **climate compensation** fund. A compensation fund at climate talks is **not new** – the 2015 landmark Paris Agreement mentions it.

- green hydrogen and a higher use of nuclear power. These are perhaps the most practical responses. Green thyself: **Climate compensation** is a just but **hard-to-implement** idea. India should focus on its own clean tech.

- is a just but **hard-to-implement** idea. India should focus on its own clean tech COP27 began in Egypt with the inclusion of **climate compensation** in the formal agenda. The compensation rests on the principle that today's developed countries

- crisis and global energy transition severely disrupted by the Russia-Ukraine crisis, **meaningful progress** on **climate compensation** negotiations appears **unlikely**. Yes, the **urgency is real**. Using 2010 as a baseline, CO2 emissions need to

- 45% by 2030 to meet the Paris Agreement's goal of limiting the increase in temperature to 1.5°C by 2100. But **waiting** for **climate compensation** **won't solve anything**. India, in particular, needs to carry out more R&D on renewable technologies.

Figure 1: Concordance lines for "climate compensation".

- of this precious resource. Incremental win: On 'Loss and Damage' fund commitment at COP27 COP27 commits to a **compensation fund**, but leaves **important questions** for later The two-week long climate conference in Egypt has drawn to a close with a

- at COP27 yielded an important breakthrough – the agreement to set up a loss and damage fund, often referred to as climate compensation fund. A **compensation fund** at climate talks is **not new** – the 2015 landmark Paris Agreement mentions it. However, acting

-to cope. But this is where a **bigger challenge** awaits the world. A transitional committee to operationalise the **compensation fund** will now have to get down to coming up with an acceptable solution. So far, important promises on financing have not

- the US and Europe together have contributed 58% of cumulative CO2 emissions. All that said, the **moot point** is **whether** a **compensation fund** is **realistic**. Consider the case of the \$100 billion per year developed countries in 2010 agreed to jointly

Figure 2: Concordance lines for "compensation fund".
(Source: The Times of India, The Indian Express and The Hindu)

Table 3 shows that the selected Indian newspapers largely approach the matter of climate change with a sense of scientific certainty, which corroborates the results of the study conducted by Mittal (2012) as well as Jogesh (2012). These traditional Indian media look at climate change as an eventuality that requires urgent attention. Interestingly, terms associated with climate scepticism are notably absent in the selected news articles, showing that conclusions made by previous studies (Billett, 2010) on the general absence of climate scepticism in the media reportage of climate change and related news in the Global South remain true for the selected newspapers as well. The study found that multi-word key terms that indicate a consequence of climate change in the scientific context and belong to the “Science” semantic set are accompanied by words that indicate concern, urgency or need for action. For example, “*loss of natural forest*” is accompanied by the word “*worrying*”, “*temperature rise*” is framed as something to “*contain*”, and “*ipcc report*” is accompanied by “*clear*”. There is a definitive lack

of a language of uncertainty when dealing with the scientific consequences or reasons for climate change in the compiled texts. This is in contrast to the media reportage of climate change in the USA or the UK, where the newspapers try to bring in a mix of scientific consensus as well as uncertainty (Song et al., 2022).

The results also reveal that Indian media frames climate action as expensive, with the repeated raising of climate funding as a concern. The finance frame is ever present in the dataset with key terms in the “Economy” category. The key terms associated with climate funding and mitigation efforts are also accompanied by terms that indicate concern for the disproportionate nature of climate funding and the role of rich nations in mitigation efforts. For example, the key term “*rich country*” is accompanied by “*lack of progress*” and “*nowhere close to delivering on their commitment*” with respect to climate action. This indicates that while Jogesh’s (2019) study revealed a shift in discourse for climate change in the Indian media from the analysis of blame for climate change and the responsibility of

Table 3: Frames and their manner of occurrence in the text

<i>S. No.</i>	<i>Frames</i>	<i>Occurrence in the text</i>	<i>Examples of lexical representations</i>
1	Climate change as a worrisome reality that requires attention.	Use of action verbs, adjectives and adverbs that express affirmation and urgency paired with key terms that figure in the semantic category of “science”.	Occurrence of “worrying” and “loss” in the context of the key term “ <i>natural forest</i> ”, occurrence of “to limit” and the verb “contain” in the concordance lines of the key term “ <i>temperature rise</i> ”, occurrence of the term “ <i>climate crisis</i> ”, occurrence of “clear” in the concordance lines of the term “ <i>ipcc report</i> ”
2	Climate Change compensation and mitigation funding as contentious.	Use of adjectives and adverbs that express contention with the key terms that belong to the semantic category of “economy”.	Occurrence of terms like “hard-to-implement”, “unlikely” with the key term “ <i>climate compensation</i> ”, occurrence of the term “difficult” to qualify “ <i>climate cooperation</i> ”
3	India as an active participant in mitigation efforts on the global stage	Use of words that indicate proactiveness with key terms that belong to all three semantic categories along with “India”	Occurrence of terms like “ <i>phase down</i> ” with the key terms “ <i>fossil fuel</i> ” and “India”. Occurrence of phrases like “ <i>focus on clean tech</i> ” with “India” and “ <i>energy transition</i> ”
4	Climate crisis mitigation as a geopolitical issue and cooperation as essential.	Use of adjectives and adverbs that indicate urgency with the key terms that belong to the semantic category of “politics” or “economy”.	Occurrence of words like “consensus” and “multi-pronged effort” with the key term “ <i>climate crisis</i> ”, repeated presence of key terms like “ <i>global body</i> ”, “ <i>framework convention</i> ”, “ <i>un convention</i> ” alongside terms that convey climate action.

developed countries to a look into the mitigation efforts and climate conversation inside the country as an active participant in climate action, the media still deems it necessary to discuss the climate debt and the cost of climate action in the global context.

Additionally, the results show that Indian media identifies the correlation between issues like heatwaves and the use of fossil fuels with climate change, and tend to discuss mitigative efforts in a positive light. The *concordance lines* of key terms like “*climate action*” and “*fossil fuel*” prominently feature mentions of India and are often concerned with the country’s own role in climate action, its efforts in combating the consequences of climate change and what it could do in the future.

Jogesh’s (2019) findings on the shifting discourse of climate change in Indian media, with the increased attention on domestic action continue to be the case with the concordance lines indicating a science-focused proactive approach. However, the current study also found that the frame of climate cooperation as an essential aspect of climate crisis mitigation is ever present in the compiled data. Key terms like “*energy transition*”, “*fossil fuels*”, “*climate diplomat*”, etc. and their *concordance lines* also reveal that the selected newspapers present the matter of climate change as a socio-political and economic issue that needs to be addressed by human intervention. The logistics of climate finance and climate action appear to be the most prominently discussed topics in the compiled articles.

Media coverage of climate change has a history of setting policy agendas on climate change (Carmichael & Brulle, 2016; Weingart et al., 2016), impacting people’s behavioural patterns on climate matters and influencing public discourses on climate change (Carvalho, 2010; Nisbet, 2009). However, most studies on these issues have focused on news media coverage of climate change in developed countries, e.g., in the USA, the UK, Australia, or European countries (Carvalho, 2007; Painter, 2014; Schäfer & Schlichting, 2014). Therefore, perspectives of news media from other parts of the world, where climate change might have more severe consequences, are necessary (Hase et al., 2021). The current study is an attempt to shed light on how Indian media perspectives are similar or different from perspectives elsewhere around the globe and, in the process, highlights that much like the Chinese media (Song et al., 2022), Indian media explicitly hold a position of climate consensus, unlike their counterparts in the developed world. The analysis also reveals that, in comparison to developing countries, Indian media attributed a larger part of the responsibility of mitigation

funding to developed countries, as shown by Post et al. (2018). The media also acknowledges the necessity of domestic action and climate cooperation.

Conclusion

By analysing the editorials of three major Indian newspapers in English, the *The Times of India*, *The Indian Express*, and *The Hindu* in the year 2022, the study identifies four key frames of climate discussion in the traditional media in India: climate change as a worrisome reality that requires attention; climate change compensation and mitigation funding by developed countries as contentious; India’s role in mitigation efforts; and climate crisis mitigation as a geopolitical issue that requires cooperation. The discussions of climate change in the three selected newspapers were centred around these key frames of conversation. The frames further led to the conclusion that these newspapers tend to adopt a positive attitude towards climate science, are keenly interested in the conversation of development in the context of climate funding, and highlight the country’s policies and presence in climate discourses on the global stage.

Furthermore, the study shows that even for studies investigating a smaller corpus containing texts like newspaper editorials, corpus-aided frame analysis can be a viable way to understand the linguistic inclinations of data sets, as done in the present study related to climate change communication in the media. Using similar methods to investigate the language of policy or legal documents, environmental assessment reports of public and private entities or even documents of scientific research may prove to be valuable, while formulating strategies to enhance public understanding of climate change and thereby empower mitigation efforts for a better future.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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