

Thematic Cluster Analysis of Online Environmental Activism from 2013 to 2025

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ABSTRACT

The accelerated development of digital media has led to a paradigm shift in environmental activism, moving from offline mobilization efforts to digital media engagement. The objective of this study is to investigate the thematic development of online environmental activism from 2013 to 2025 using a thematic cluster analysis approach. By employing bibliometric methods and keyword co-occurrence analysis, this research study identifies the major themes, determines the structural relationships between research topics, and analyzes the temporal trends in the research landscape. The results show that social media and activism serve as major hubs that connect sustainability discourse, digital communication, and civic engagement. The network visualization shows a strongly interconnected thematic structure, while the overlay analysis shows a transition from the early days of internet-based activism to the current themes of sustainability governance, environmental communication, and digital citizenship. The density visualization also emphasizes the focus of research on digitally mediated activism, suggesting continuity in the fundamental research interests, as well as the development of new interdisciplinary research perspectives. This research study adds to the body of knowledge on the development of environmental activism in digital environments and offers insights into future research directions on participatory governance, communication, and digitally facilitated environmental activism.

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1. INTRODUCTION

In the last decade, digital media has profoundly reshaped how social movements mobilize, communicate, and influence public discourse. Environmental activism, traditionally grounded in offline campaigns and grassroots organizing, has increasingly incorporated online platforms as central arenas for advocacy [1], [2]. Platforms such as Twitter, Facebook, Instagram, and emerging forums like TikTok have expanded the reach

of environmental messages, enabling real-time framing of issues, collective sense-making, and viral advocacy [3]. In Indonesia, a nation characterized by vast ecological diversity and complex socio-political structures, digital activism has emerged as both a space for citizen engagement and a contested ground for environmental governance debates [4].

Indonesia's environmental challenges—ranging from deforestation,

marine pollution, peatland fires, to climate change impacts—have increasingly garnered public attention over the past decade [5]. These issues intersect with broader concerns of human rights, indigenous land claims, and economic policy, making environmental advocacy a multifaceted and politically charged domain. Online activism has provided Indonesian citizens, civil society organizations, and youth networks with powerful tools to articulate environmental concerns, organize collective actions, and pressure state or corporate actors for policy change [6]. By leveraging hashtags, digital petitions, multimedia storytelling, and networked mobilization, online advocates have cultivated translocal environmental communities that transcend geographic boundaries [7].

Despite the rapid proliferation of digital activism, scholars have noted a persistent gap in understanding how thematic narratives evolve over time, particularly in relation to broader socio-ecological changes [8]. Previous studies on Indonesian environmental campaigns often focus on specific events—such as the 2015 forest fire crisis or the 2019 plastic waste movement—but lack comprehensive longitudinal analyses that track thematic patterns from year to year [9], [10]. A thematic cluster analysis addresses this gap by identifying dominant topics, recurring discourses, and shifts in collective framing across multiple years of online activism. This approach illuminates not only what issues are most salient, but also how public priorities, coalition strategies, and digital rhetoric co-evolve within Indonesia's environmental movement.

The period from 2013 to 2025 in Indonesian environmental activism is especially significant. In 2013, grassroots organizations began intensifying their digital engagement following the anti-mining campaigns in Kalimantan and Sumatra, marking an inflection point in the use of social media for environmental advocacy [11]. Subsequently, the 2015 peatland fires catalyzed nationwide outrage that online networks amplified, propelling environmental concerns into mainstream

political discourse [12], [13]. The COVID-19 pandemic further transformed digital activism, as restrictions on physical gatherings pushed environmental advocates to innovate virtual protest strategies and expand online outreach [14]. As Indonesia advances into the mid-2020s—marked by shifts in environmental governance, climate commitments, and youth engagement—the need to systematically understand how online activism reflects and shapes these transitions has never been more pressing.

A thematic cluster analysis integrates qualitative interpretation with computational techniques to map patterns in large text corpora, making it suited for longitudinal studies of online engagement [15]. By analyzing archived tweets, Facebook posts, Instagram captions, and blog narratives from 2013–2025, this study identifies core clusters of environmental themes, evaluates their temporal trajectories, and assesses how external events influence online discourse. Such an analysis not only contributes to a deeper academic understanding of digital environmentalism in Indonesia but also informs activists, policymakers, and civil society about effective narrative strategies and emerging advocacy trends. Ultimately, unpacking the thematic dimensions of online environmental activism sheds light on how Indonesians collectively negotiate ecological challenges in a digital era.

While research on digital activism in Southeast Asia has grown, Indonesian case studies remain underrepresented in global discourse—particularly studies that combine longitudinal breadth with analytical depth [16], [17]. Existing scholarship tends to treat online environmental advocacy as episodic or fragmented, focusing on discrete campaigns without accounting for continuity and thematic evolution across multiple years. This limits our ability to appreciate how movements adapt, sustain engagement, and form resilient identities in the face of political, economic, and environmental pressures. Moreover, automated analyses of social media data are often constrained by short time frames or narrow topical scopes, underscoring the need for a comprehensive

study that situates thematic clusters within broader socio-political contexts.

Importantly, Indonesia's demographic composition—featuring a large youth population with high mobile internet penetration—positions digital activism as a potent force in shaping public environmental consciousness [18]. Young activists have pioneered creative narrative forms, from meme campaigns to live-streamed mobilizations, expanding the expressive range of environmental discourse [19]. At the same time, environmental movements have encountered challenges, including digital censorship, online harassment, and misinformation campaigns aimed at diluting climate and conservation messages [20]. Understanding how thematic clusters emerge, persist, or decline in such a contested digital ecosystem is crucial for interpreting both the potentials and limitations of online environmental activism. The period up to 2025 is marked by significant policy shifts which have direct bearings on public discourse. Indonesia's updated climate commitments, revisions to environmental regulations, and new commitments to sustainable development frameworks have stimulated both support and resistance among online communities (Setiawan, 2024). These shifts provide fertile ground for examining how environmental activists respond rhetorically and strategically to evolving governance agendas. Through thematic cluster analysis, this research captures the nuances of online environmental communication, revealing how advocates frame issues, mobilize collective sentiment, and negotiate institutional domains over an extended period.

Despite the increased visibility of online environmental activism in Indonesia, there remains a lack of longitudinal research that systematically maps the thematic evolution of digital advocacy from 2013 to 2025. Most existing studies focus on individual campaigns or short time windows, overlooking how core themes emerge, transform, or diminish in response to socio-ecological events, policy changes, and digital platform dynamics. Consequently, there is

limited understanding of the structural patterns and narrative strategies that sustain online environmental movements in Indonesia over time. The objective of this study is to conduct a thematic cluster analysis of online environmental activism in Indonesia from 2013 to 2025 to identify dominant themes, examine their temporal trajectories, and interpret how socio-political and ecological contexts shape digital environmental discourse.

2. METHOD

This study employed a mixed-methods research design combining computational text analysis with qualitative thematic interpretation to examine online environmental activism in Indonesia from 2013 to 2025. The research focused on publicly accessible research database namely Scopus Database. Data were collected using keyword-based scraping and archival retrieval techniques, incorporating Indonesian and English terms related to environmental issues such as deforestation, climate change, waste management, mining conflicts, peatland fires, renewable energy, and environmental justice. The dataset was limited to posts originating from Indonesian users or explicitly addressing environmental issues within the Indonesian context. To ensure temporal representation, data were proportionally sampled across each year from 2013 to 2025. All collected data were anonymized, and the research adhered to ethical standards concerning digital research, including privacy protection and responsible data handling.

Following data collection, the textual corpus underwent preprocessing procedures to prepare it for analysis. These steps included data cleaning, removal of duplicates, elimination of stop words, normalization of slang and abbreviations commonly used in Indonesian digital communication, tokenization, and lemmatization. Non-relevant content such as advertisements or unrelated political messaging was filtered out through manual verification and automated classification techniques. The cleaned dataset

was then analyzed using bibliometric technique and thematic cluster analysis.

3. RESULT AND DISCUSSION

3.1 Result

a. Network Visualization of Themes

The network visualization of themes shows the structural connections between important themes in the literature on online environmental activism between 2013 and 2025. Using the analysis of keyword co-occurrence, the visualization shows the different

thematic clusters that represent the evolution of scholarly conversations on digital platforms, environmental discourse, and collective action. The size of the nodes shows important concepts that are frequently discussed, and the distance between nodes shows stronger conceptual connections, suggesting that the literature in this area is very interdisciplinary and influenced by communication studies, environmental governance, and digital sociology.

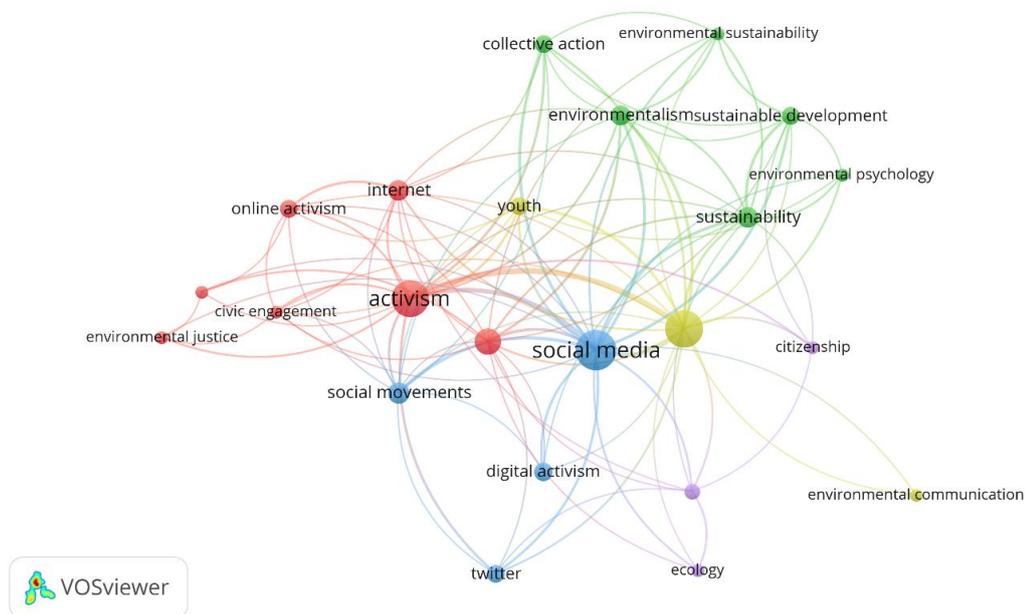


Figure 1. Network Visualization
Source: Data Analysis

Figure 1 shows the structural makeup of thematic relations in the research environment of online environmental activism from 2013 to 2025. The central placement of social media reflects its importance as the primary bridge between various research themes. The strong ties of social media to research terms like activism, sustainability, online environmental activism, and citizenship reflect the growing understanding of environmental activism as a social media-mediated process, where social media sites

serve not only as communication platforms but also as spaces for mobilization, discourse, and engagement. The presence of a strong cluster around the theme of activism, which is strongly tied to online activism, civic engagement, environmental justice, and internet movements, reflects the socio-political aspect of environmental activism, which emphasizes participation, engagement, and collective action on social media. The dense connections within this cluster also reflect that the earlier research on

this topic was heavily invested in understanding activism as a complex web of social movements and civic engagement, as opposed to a purely environmental problem.

Another important cluster is related to sustainability and other concepts like environmental sustainability, sustainable development, environmental psychology, and collective action. The positioning of this cluster in the upper portion of the network indicates a thematic extension of research from activism to behavioral and sustainability-focused research streams. This highlights the increasing interest of research scholars in investigating how online activism is shaping sustainable behavior, environmental awareness, and overall ecological transformations at both individual and collective levels. The blue cluster connecting social media, digital activism, twitter, and social movements indicates the technological infrastructure that enables online environmental activism. The presence of particular keywords like twitter in the cluster indicates that empirical research often focuses on digital traces and online platform interactions to understand

the development of environmental stories. The bridging function of digital activism between the activism and sustainability clusters indicates that technology is an important mechanism that connects environmental activism with communication studies and media research.

The structure of the network shows a multidimensional and very interconnected thematic environment. The study of environmental activism has developed from a traditional civic engagement paradigm to a more comprehensive model that encompasses sustainability discourse, online platforms, and participatory citizenship. The closeness of the clusters indicates that the current literature is incorporating an interdisciplinary perspective that brings together environmental studies, online communication, and social movement theory to understand the complexity of online environmental activism in the digital age.

b. Trend of Themes

The overlay visualization presents the temporal evolution of research themes in online environmental activism

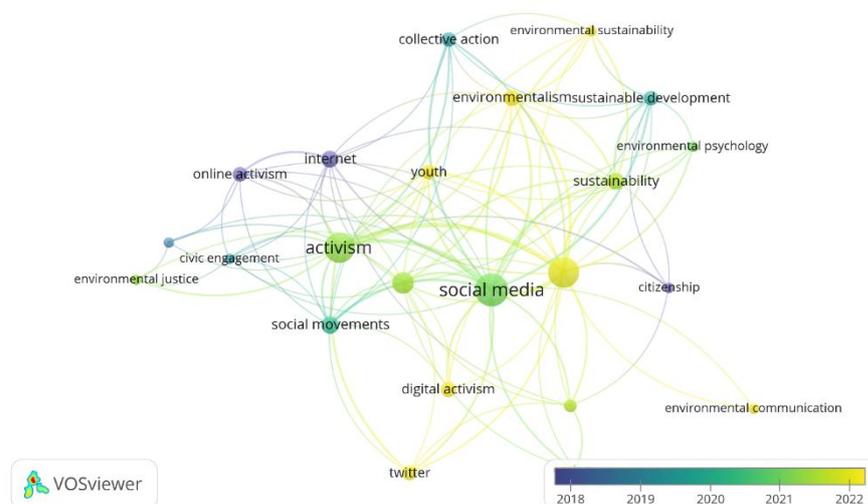


Figure 2. Overlay Visualization

Source: Data Analysis

In Figure 2, the development of themes over time in online environmental activism is shown through the use of color gradients that symbolize the average year of publication. The earlier themes, which are denoted by darker shades of blue, are described by keywords such as online activism, internet, and environmental justice. These themes symbolize the foundational stage of the subject, during which research was dominated by the need to understand the role of the internet in the facilitation of civic engagement and online activism.

As one progresses towards the mid-point of the timeline, symbolized by green hues, issues like activism, social movements, and social media rise to the forefront and take center stage in the network. This signifies that there was a point of transition where researchers started to incorporate environmental activism with the existing discourse on participatory culture and

collective online action. The rising number of links centered on social media indicates that there was a focus on research that explored the ways in which these platforms mediate communication strategies, public discourse, and the creation of networked communities around environmental concerns. In the most contemporary phase, symbolized by yellow colors, new themes such as sustainability, environmental sustainability, citizenship, environmental communication, and digital activism come to the forefront as the preeminent areas of research.

c. Density Visualization

The density visualization highlights the intensity and concentration of research themes within the field of online environmental activism. Areas displayed in warmer colors indicate topics that receive greater scholarly attention and appear more frequently within the literature.

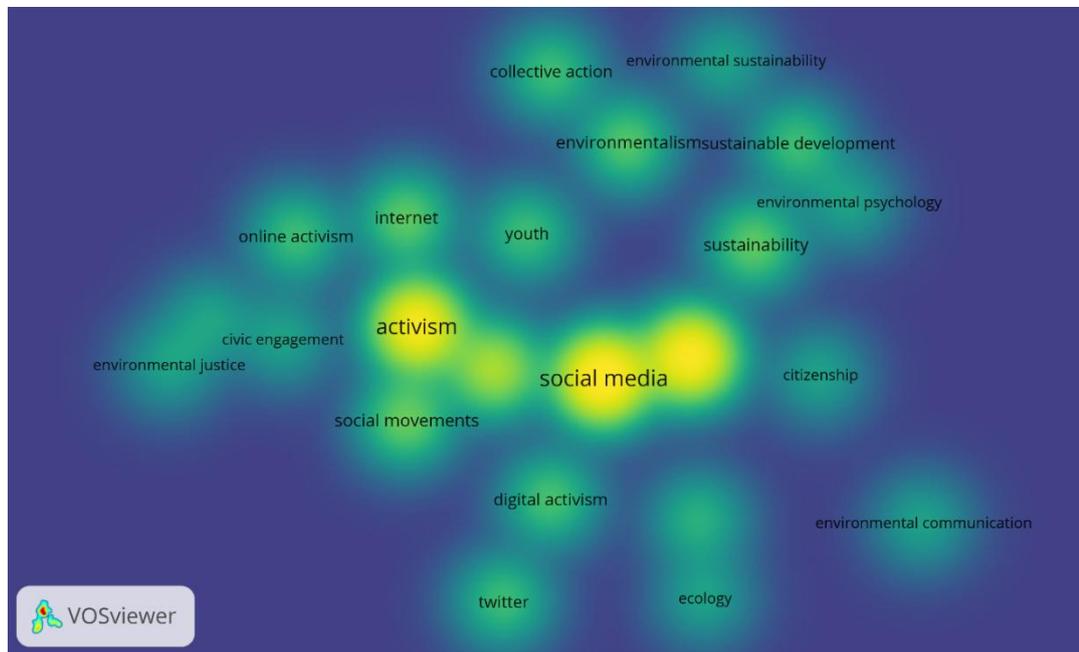


Figure 3. Density Visualization
Source: Data Analysis

Figure 3 above shows the focus of the major themes of research

in the area of online environmental activism. The brightest and most

intense spot is located around the themes of social media and activism, which are the central points of intellectual inquiry in the literature between 2013 and 2025. The intensity of these themes suggests that researchers have been actively investigating the role of online platforms in facilitating environmental activism and participation. The themes of social movements, civic engagement, and the internet, which are closely related, also suggest this.

In addition to the core, the regions of moderate density include sustainability, environmental sustainability, environmental

psychology, and digital activism, which represent the growing interdisciplinary focus of the field. The regions of moderate density suggest that current research is increasingly incorporating the study of environmental governance, behavioral approaches, and communication methods into the study of activism. The regions of lower density, such as environmental communication and ecology, represent new or more specialized areas of research that have been less developed but offer promise for future research.

d. Top Cited Literature

Table 1. Most Cited Article

Citations	Author and Year	Title
229	[21]	What drives pro-environmental activism of young people? A survey study on the Fridays For Future movement
194	[22]	“No Fracking Way!” Documentary Film, Discursive Opportunity, and Local Opposition against Hydraulic Fracturing in the United States, 2010 to 2013
136	[23]	Climate activism and its effects
126	[24]	Social media empowerment in social movements: power activation and power accrual in digital activism
123	[25]	From social media diet to public riot? Engagement with “greenfluencers” and young social media users' environmental activism
109	[26]	Evaluating people's awareness about climate changes and environmental issues: A case study
109	[27]	Portraying the Perils to Polar Bears: The Role of Empathic and Objective Perspective-taking Toward Animals in Climate Change Communication
104	[28]	From Equality-Based Respect to Environmental Activism: Antecedents and Consequences of Global Identity
91	[29]	The ecological conscious consumer behaviour: are the activists different?
89	[30]	The palgrave handbook of global citizenship and education

Source: Scopus, 2026

3.2 Discussion

a. Overview of Findings

The thematic cluster analysis indicates that studies on online environmental activism between 2013 and 2025 have developed into a very interconnected and interdisciplinary area of study that is influenced by online communication, sustainability

discourse, and civic engagement. The network analysis indicates that social media is the central node that connects the themes of activism, sustainability, and online communication, and this suggests that environmental activism is being increasingly framed by online engagement. The overlay analysis

also indicates that there is a very clear temporal distinction between the early studies that focused on online mobilization and internet activism and the more contemporary studies that are focused on sustainability governance, environmental communication, and digital citizenship. The density visualization also confirms that the themes of activism and social media are the intellectual center of the field, and this suggests that there is a continuity of focus despite the emergence of new themes.

b. Practical Implications

The results have a number of key takeaways for policymakers, activists, and digital communication practitioners. Firstly, the importance of social media means that successful environmental campaigns must focus on engagement strategies on the platforms that promote participation, framing, and community engagement. Secondly, the increasing importance of sustainability themes means that digital activism is increasingly linked to long-term environmental awareness and behavior change, rather than just short-term protest mobilization. This means that organizations and environmental institutions can use digital activism as a means of public education and collaborative governance. Furthermore, the increasing importance of themes such as digital activism and environmental communication means that the effectiveness of campaigns is not just dependent on message content, but also communication design and audience interaction patterns.

c. Theoretical Contributions

From a theoretical standpoint, this research makes several contributions to the existing body of knowledge by illustrating the ways in which online environmental activism has evolved from a

traditional social movement paradigm towards an integrated approach that incorporates digital sociology, sustainability science, and communication theory. The thematic clustering approach illustrates the ways in which activism is converging with other ideas such as citizenship, environmental psychology, and collective action, which not only points to a larger shift towards participatory environmental governance but also suggests that digital technologies are not only transforming activism in practice but also in terms of conceptualization, stretching existing theories of social movements into the digital age. Through this overlay analysis, this research offers a systematic framework for future studies on emerging themes such as platform governance, algorithmic activism, and data-driven environmental engagement.

4. CONCLUSION

This research work offers a thorough thematic mapping of online environmental activism studies from 2013 to 2025, showing a dynamic development from the early discourse on digital mobilization and civic engagement to a more complex and sustainability-focused research environment. The results show that social media and activism are the intellectual nucleus of the research environment, while new themes such as environmental communication, digital citizenship, and sustainability governance indicate the increasing convergence of technological, social, and ecological approaches. The temporal development shown by the overlay analysis indicates that researchers are increasingly recognizing online activism not only as a form of protest but also as a tool for long-term environmental awareness and collective action. In conclusion, this research work emphasizes the interdisciplinary character of current environmental activism research and

provides a basis for future studies on digitally mediated environmental engagement in a

rapidly changing technological and social environment.

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