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Ecological Crisis and Human Failure of Trust: A Comparative-Synthetic Analysis of Classical Kalam and Modern Science Perspectives on Ecological Disasters

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INFO ARTIKEL	ABSTRACT
Sejarah Artikel: Diterima : 12 Mei 2026 Disetujui : 21 Mei 2026 Dipublikasi : 1 Juni 2026	<i>The end of 2025 marked a period of severe ecological crisis in Aceh, North Sumatra, and West Sumatra, characterized by systemic flash floods and landslides. This study aims to bridge the empirical findings of modern environmental science with the theological perspective of classical kalam to comprehensively understand the ecological crisis as both an environmental and moral-spiritual issue. From a modern academic perspective, these disasters were amplified, beyond the extreme-rainfall trigger, by upstream watershed degradation, deforestation driven by palm oil expansion, and peatland damage, all of which reduce the ecosystem's capacity to absorb water. Conversely, the classical kalam perspective provides a normative framework that views nature as a harmonious system created by God and entrusted to humanity. Ecological destruction is thus interpreted as a consequence of humanity's moral failure to fulfill the divine trust (amanah) as stewards (khalifah), representing an ethical violation against the cosmic order (fasad fi al-arḍ). This multidisciplinary synthesis yields an integrative understanding that addressing contemporary environmental crises requires not only physical ecosystem restoration and governance improvement, but also the reconstruction of humanity's ethical-spiritual awareness toward nature.</i>
Kata Kunci: <i>Ecological Disaster, Environmental Science, Classical Kalam, Amanah, Fasād fi al-Arḍ</i>	
Keywords: Bencana Ekologis, Ilmu Lingkungan, Kalam Klasik, Amanah, <i>Fasād fi al-Arḍ</i> .	

INTRODUCTION

The late November to December 2025 period became a serious ecological crisis for the regions of Aceh, North Sumatra, and West Sumatra. During this timeframe, various areas experienced high-intensity flash floods and landslides that caused casualties, residential damage, and widespread socio-economic impacts. As of 26 December 2025, BNPB recorded 1,137 deaths and 163 people still missing across the three provinces (Kontan, 2025), and more than 157 thousand damaged houses had been reported as of 11 December 2025 (NU Online, 2025). Humanitarian situation reports document the wider humanitarian impact (Human Initiative, 2025). The scale of the destruction indicates that this disaster should not be understood merely as a regular natural phenomenon, but also as an environmental crisis with structural and systemic dimensions.

Climatologically, extreme rainfall was indeed the main trigger for the floods and landslides. Nevertheless, various academic studies show that the magnitude of the disaster's impact was heavily influenced by long-term environmental degradation. Hatma Suryatmojo, a forest hydrology researcher at Universitas Gadjah Mada, emphasized that the destruction of forest ecosystems in the upstream areas of watersheds (DAS) led to a decline in the soil's capacity to absorb rainwater, thereby increasing surface runoff and worsening the potential for flash floods and landslides (Universitas Gadjah Mada, 2025).

Furthermore, environmental degradation in Aceh is also closely related to large-scale plantation expansion. Fasya, Praza, and Fariadi (2022) in their research on the impact of oil palm expansion (sawitisasi) in North Aceh demonstrated that the loss of forest cover due to plantation land conversion reduced the ecological function of the area, particularly in retaining water and maintaining soil stability. This condition contributed significantly to the region's heightened vulnerability to floods and extreme environmental changes (Fasya et al., 2022).

A study regarding regional vulnerability to flooding was also conducted by Wulandari and Helmi (2020) in the Krueng Jreue Sub-watershed, Aceh Besar. The results of their research showed that the level of flood vulnerability is highly influenced by bio-geophysical factors such as vegetation cover, slope steepness, and land-use change. This study indicates that physical environmental damage is closely associated with a higher risk of hydrometeorological disasters (Wulandari & Helmi, 2020).

Moreover, environmental degradation in Aceh has impacts not only on ecological aspects but also implications for the social conditions of the community. Juliansyah et al. (2025) showed that a decline in environmental quality has a strong correlation with rising poverty in post-conflict Aceh. Ecological damage in this context does not only destroy nature, but also weakens the social and economic resilience of the community in facing disasters (Juliansyah et al., 2025).

Although various modern scientific studies have explained the cause-and-effect relationship between environmental damage and natural disasters, such approaches often stop at technical aspects and policy. The ethical and theological dimensions underlying human behavior toward nature are still rarely explored in depth. In the Islamic tradition, particularly within classical kalam theology, the relationship between humans and nature is built upon the principles of tawhid, amanah (trust), and moral responsibility. Nature is understood as God's creation that possesses order and purpose, while humans are placed as khalifah (stewards) responsible for maintaining balance and preventing destruction.

Accordingly, the 2025 Aceh–Sumatra ecological disaster can be read not only as a failure of environmental management, but also as a reflection of human moral failure in fulfilling divine trust. This study attempts to bridge the empirical findings of modern environmental science with the normative perspective of classical kalam, in order to present a more comprehensive understanding of the ecological crisis as both an ecological and a theological issue.

METHOD

This qualitative study, based on library research, applies an integrative-multidisciplinary approach that deliberately dialogues the empirical findings of modern environmental science with the normative texts of Islamic theology or classical *kalam*. The integration follows the integration–interconnection paradigm of Amin Abdullah (2006), in which religious and scientific knowledge are treated as distinct domains that inform one another, and draws on Islamic ecotheology (Nasr, 1996; Izzi Dien, 2000; Foltz et al., 2003) as the conceptual bridge between environmental ethics and kalam concepts. Accordingly, kalam is not used to explain physical processes; it supplies an ethical-theological framework for interpreting what environmental science explains. Data collection was conducted through documentation and literature study methods to gather secondary data, which includes situation reports on hydrometeorological disasters in the Aceh and Sumatra regions at the end of 2025, bio-geophysical studies regarding deforestation and land-use conversion, as well as theological literature related to the thoughts of the *mutakallimūn* on the concepts of *amanah* (trust), human free will (*ikhtiyar*), and destruction of the earth (*fāsād fī al-arḍ*). The collected data were then processed using content analysis and comparative-synthetic analysis techniques. The analytical process began by reducing empirical data regarding the physical mechanisms causing floods and landslides, which were subsequently juxtaposed with the mapping of classical ethical-theological concepts to explore the moral dimension behind human actions. Through this integrative synthesis, the scientific explanation of physical environmental degradation is read through kalam concepts as an ethical-theological interpretation of human responsibility toward nature (*amanah*). This is an interpretive framework, not an empirical claim about the spiritual condition of particular actors. In the final stage, a

conceptual conclusion is drawn that rejects a fatalistic view of disasters, while simultaneously offering a reconstruction of ethical-spiritual awareness as a fundamental preventive step in addressing contemporary ecological crises.

Source selection followed explicit criteria. Empirical sources were included if they (a) addressed forest or land-cover change, soil erosion, peatland degradation, flood vulnerability, or the socio-economic effects of environmental degradation in Aceh or Sumatra; (b) were published between 2016 and 2025 in scholarly journals or issued by official or recognized institutions (BNPB, BMKG, Human Initiative, Universitas Gadjah Mada); and (c) were available in full text. Theological sources were included if they discussed *amanah*, *khalifah*, *ikhtiyar*, or *fasād fī al-arḍ* within the classical kalam tradition (Ash'ariyyah, Maturidiyyah, and the works of Fakhr al-Dīn al-Rāzī). Literature was searched through Google Scholar, Garuda, and Scopus and institutional websites between January and February 2026, using keywords such as *banjir bandang Aceh*, *alih fungsi lahan*, *sawitisasi*, *amanah*, and *fasād fī al-arḍ*. News items were used only for official disaster data and for statements by identifiable experts; opinion pieces without identifiable evidence were excluded.

Analysis proceeded in three steps. First, empirical sources were coded into four categories: hydrometeorological triggers, upstream land-cover and land-use change, peatland and plantation pressures, and socio-economic impacts. Second, theological sources were coded into the concepts of *tawhid*, *amanah*, *khalifah*, *ikhtiyar*, and *fasād fī al-arḍ*. Third, the two coded sets were compared through concept mapping, in which each empirical category was paired with the kalam concept that offers an ethical interpretation of it (for example, upstream deforestation and the breach of *amanah* and *khalifah*). The mapping is interpretive: it identifies conceptual correspondences and does not test causal relationships between moral conditions and physical outcomes.

RESULTS AND DISCUSSION

Scope of the evidence. The disaster affected Aceh, North Sumatra, and West Sumatra. BNPB recorded 1,137 deaths and 163 missing persons across the three provinces as of 26 December 2025 (Kontan, 2025). The empirical studies discussed below were conducted in specific Aceh watersheds and districts (Krueng Meuh, Krueng Jeue, North Aceh, and Trumon–Singkil) and are not studies of the 2025 event itself. They are therefore used as evidence of plausible mechanisms, not as proof of what caused this disaster, and their findings cannot be generalized automatically to North Sumatra and West Sumatra.

Other contributing factors. Extreme rainfall was the immediate trigger. BMKG reported that rainfall on 25–27 November 2025 was extreme, reaching up to 411 mm in a single day in Bireuen, in association with Tropical Cyclone Senyar (Rahmawati, 2025). A BMKG official later

stated that climate change also contributed to the extreme rainfall (Sari, 2026), and a February 2026 forum involving ITB and BMKG identified the cyclone as the main trigger (iNews, 2026). At the same time, WALHI estimated that about 1.4 million hectares of forest in the three provinces were cleared between 2016 and 2025 for plantations, mining, and other permits (The Jakarta Post, 2025), and public statements differ on how much illegal logging, licensed concessions, mining, and spatial-planning decisions contributed (Mongabay, 2025). This study does not quantify these factors or rank their contributions. The sections below should therefore be read as describing mechanisms that amplified the impact of the disaster, not as establishing a single cause.

Environmental Issues According to Modern Academic Perspectives

In modern academic studies, environmental issues are understood as the result of complex interactions between natural factors and human activities. The flash floods and landslides that struck Aceh and other regions of Sumatra in late 2025 are analyzed not only as hydrometeorological phenomena, but also as consequences of systemic environmental degradation. The environmental science approach emphasizes that the increasing frequency and intensity of disasters serve as indicators of declining ecosystem carrying capacity due to land-use change, deforestation, and unsustainable regional governance.

Research regarding forest land conversion in Aceh shows that environmental damage in upstream areas is associated with a greater risk of disasters in downstream areas. Ahmad et al. (2024) in their study in the Krueng Meuh Sub-watershed, Aceh, explained that the conversion of forest into non-forest land caused an increase in soil erosion, land degradation, and a decrease in the soil's capacity to absorb water. This condition implies an increase in surface runoff, which amplifies the potential for flash floods. These findings suggest that environmental damage is not merely a background to disasters, but a major contributing factor that amplifies their impact when extreme rainfall occurs (Ahmad et al., 2024).

Environmental issues in Aceh are also closely linked to the uncontrolled expansion of large-scale plantations. Fasya, Praza, and Fariadi (2022) in their research on the impact of oil palm expansion (sawitisasi) in North Aceh demonstrated that the conversion of forest into oil palm plantations led to the loss of the forest's ecological function as a water regulator and disaster buffer. The reduction in vegetation cover resulted in the region's increased vulnerability to flooding, particularly during high-intensity rainy seasons. This study indicates that development policies that disregard environmental aspects can contribute to a rising risk of natural disasters (Fasya et al., 2022).

Apart from forests, peatlands have also become ecosystems under serious pressure due to human activities. Aswandi et al. (2016) in the *Journal of Man and Environment (Jurnal Manusia dan Lingkungan)* Universitas Gadjah Mada explained that drainage and degradation of peatlands

in the Trumon and Singkil regions of Aceh caused a decline in the groundwater table and significant carbon loss. This degradation can weaken the hydrological function of peat as a natural water reservoir, which is generally expected to raise flood risk in surrounding areas, although Aswandi et al. measured carbon loss and land subsidence rather than flooding itself. These findings demonstrate that peatland ecosystem destruction has multi-layered ecological impacts, on both local and global scales (Aswandi et al., 2016).

Studies on regional vulnerability to flooding also reinforce the relationship between physical environmental conditions and disaster risks. Wulandari and Helmi (2020), through their study in the Krueng Jreue Sub-watershed, Aceh Besar, showed that the level of flood vulnerability is highly influenced by bio-geophysical factors such as vegetation cover, slope steepness, and land-use change. This research indicates that physical environmental degradation is associated with higher disaster potential, which supports the view that mitigation efforts should include ecosystem restoration (Wulandari & Helmi, 2020).

Based on these various findings, modern academic perspectives assert that environmental damage is the outcome of human development choices that disregard sustainability principles. Natural disasters are no longer understood as isolated, natural events, but rather as symptoms of a structural crisis in environmental management. This approach provides a solid empirical foundation for understanding that disaster management efforts must be directed toward ecosystem restoration, environmental governance improvement, and a paradigm shift in development.

Nevertheless, although the modern academic approach is capable of explaining cause-and-effect relationships scientifically, it still leaves room for reflection in the realm of values and ethics. This is where the importance of dialogue with theological perspectives, particularly classical kalam, lies to complement scientific analysis with a moral and spiritual foundation in interpreting and responding to the environmental crisis.

Environment According to the Classical Kalam Perspective

In the tradition of classical Islamic thought, particularly within the discipline of kalam, the discussion of nature does not stand as an independent ecological theme as it does in modern environmental science. Nevertheless, the theological concepts developed by the *mutakallimūn* contain a strong normative framework regarding the relationship between God, humans, and the universe. Nature is understood as God's creation (*makhlūq*) that is subject to divine law (*sunnatullāh*), while humans are placed as moral subjects endowed with free will and responsibility for their actions in the world.

A central concept in classical kalam relevant to environmental issues is the principle of *amanah* (trust) and the moral responsibility of humans. Within the framework of both *Asy'ariyyah* and *Maturidiyyah* theology, humans are understood as creatures given the capacity to choose

(ikhtiyar) while simultaneously being held accountable for the consequences of their actions. This means that any form of destruction on earth cannot be detached from the role of humans as moral agents. The journal *Aqidah-Ta* explains that the concept of amanah in Islamic theology contains a broad ethical dimension, including the obligation to maintain the order of creation and to avoid actions that cause destruction (fasad) on the face of the earth (Rusli et al., 2025). This theological understanding finds a direct Qur'anic foundation in the concept of *fasād fī al-arḍ*, particularly in QS. Ar-Rūm/30:41, which explicitly connects the emergence of corruption on earth with human actions.

﴿ظَهَرَ الْفَسَادُ فِي الْبَرِّ وَالْبَحْرِ بِمَا كَسَبَتْ أَيْدِي النَّاسِ لِيُذِيقَهُمْ بَعْضَ الَّذِي عَمِلُوا لَعَلَّهُمْ يَرْجِعُونَ﴾

Translation:

Corruption has appeared throughout the land and sea by reason of what the hands of people have earned, so He may let them taste part of the consequences of what they have done that perhaps they will return [to righteousness]. (QS. Ar-Rūm/30:41).

The verse establishes a significant ethical dimension of ecological degradation: environmental destruction is not merely a physical phenomenon, but may also reflect the consequences of human actions and moral choices. The phrase “bimā kasabat aydī al-nās” (because of what the hands of people have earned) emphasizes human agency and responsibility, while the closing phrase “la‘allahum yarji‘ūn” (that perhaps they may return) indicates the possibility of moral correction. In this sense, the Qur'anic conception of *fasād* provides a normative foundation for understanding ecological destruction as both an environmental and ethical-spiritual crisis.

In the view of classical mutakallimūn such as Fakhruddin ar-Rāzī, the universe is understood as a harmoniously and rationally ordered system serving as a sign of God's wisdom. Ar-Rāzī rejects the view that nature is chaotic or without purpose. On the contrary, every element of nature has a function within the cosmic order. Environmental destruction, therefore, is not the direct will of God, but rather the result of the misuse of human free will against the established laws of nature. This perspective is reaffirmed in theological studies stating that ar-Rāzī's cosmic theology positions nature as an ethical space that demands human responsibility, not merely as an object of exploitation (Adi Ihza Baharudin et al., 2025).

In the context of human will and actions, the classical debate between the Jabariyyah and Qadariyyah also carries significant ecological implications. The kalam of Ahl al-Sunnah attempts to take a moderate position by asserting that humans play an active role in their actions, even though they remain within the absolute will of God. This theological stance rejects a fatalistic attitude in interpreting natural disasters. The understanding of classical kalam affirms that human action necessitates ethical responsibility for the social and ecological impacts of human deeds, including environmental degradation (Jamaluddin, 2020).

Divine justice (‘adl ilāhī) is not understood as a legitimization of causeless suffering, but rather as a principle asserting that imbalance and destruction in the world are often the consequences of human deviation from God's commands and prohibitions. In this context, natural disasters can be read as an indirect result of human ethical violations against the cosmic order (Muthahhari, 1992).

Consequently, the classical kalam perspective provides a theological framework that views environmental damage not merely as a technical or ecological issue, but as a moral and spiritual problem. Nature is not positioned as a neutral entity, but rather as part of a divine system possessing intrinsic value. When humans destroy nature, they are in truth not only damaging the physical environment, but are also violating the theological trust (amanah) inherent to their existence as khalifah (stewards) on earth.

This reading becomes crucial when confronted with the 2025 Aceh Sumatra ecological crisis. While modern academic perspectives explain how deforestation and ecosystem degradation worsen disasters, the classical kalam perspective provides the normative foundation to understand why such destruction constitutes a human moral failure. Thus, classical kalam does not stand as a theological discourse detached from reality, but rather as a relevant ethical framework for reading and responding to contemporary environmental crises.

Synthesis of Classical Kalam and Modern Environmental Science

An analysis of environmental issues from two realms of thought, modern academic and classical kalam theology, shows an important point of convergence in understanding the 2025 Aceh–Sumatra ecological crisis. Modern environmental science explains empirically how ecosystem degradation and land-use change exacerbate disaster risks, while the classical kalam tradition provides a moral and normative foundation that explains the ethical roots of such destruction.

In modern academic studies, various researches have shown that upstream ecosystem damage, such as the loss of forest cover, deforestation, and land degradation, is linked to an increased risk of disasters. Research by Ahmad et al. (2024) shows that forest conversion into non-forest land in the Krueng Meuh Sub-watershed, Aceh, caused soil erosion and increased surface runoff that triggered flash floods, which suggests that changes in the physical environment can influence the frequency and intensity of disasters (Ahmad et al., 2024). This finding is reinforced by Fasya, Praza, and Fariadi (2022), who demonstrated that the conversion of forest into oil palm plantations in North Aceh weakens the ecological role of forests as a water retention and soil-binding system, making communities in that region more vulnerable to floods when rainfall is high (Fasya et al., 2022).

Furthermore, peatland damage in the Trumon and Singkil regions also suggests that the

loss of the hydrological function of peat areas may raise local flood risk and, according to field measurements, results in significant carbon loss within the ecosystem material. The findings of Aswandi et al. (2016) indicate that reclosing drainage and peatland degradation weaken the soil's capacity to retain water, which becomes a contributing factor to the rising danger of floods (Aswandi et al., 2016).

Overall, these studies suggest that environmental damage is a structural factor influencing the dynamics of natural disasters. However, even though this empirical illustration is informative, it still requires a foundation of values to explain why such destruction occurs on a systemic scale. This is where the classical kalam perspective provides insights that complement the modern approach.

In the kalam tradition, the concept of amanah becomes a fundamental framework for understanding the relationship between humans and nature. The journal *Aqidah-Ta* explains that amanah is not merely a positive obligation, but also a moral duty to maintain the order of creation and prevent destruction (*fasād*) on earth, a principle that is relevant when applied to the issues of forest destruction and flooding.

Fakhruddin ar-Rāzī's view regarding the cosmic order as a harmonious and purposeful system asserts that nature must not be treated merely as an object, but as part of a divine order that must be respected. Ar-Rāzī emphasizes that environmental destruction is a consequence of human deviation from divine laws, not the direct will of God, so that human moral responsibility becomes key in reading ecological disasters.

The classical kalam perspective also rejects a fatalistic attitude in understanding disasters. The moderate position taken by the Ahl al-Sunnah circle asserts that humans possess the power of action under the will of God. However, it emphasizes that this understanding implies that humans will be held morally accountable for the social and ecological impacts of their choices.

The synthesis between modern environmental science and classical kalam produces four complementary conceptual points. First, the modern approach shows what happens empirically, such as the loss of the ecological functions of forests and peatlands that increases disaster risks. Second, classical kalam theology explains why such destructive human behavior occurs from a moral perspective, namely because amanah has been violated and humans choose exploitation over preservation. Third, this synthesis depicts ecological disasters not merely as natural phenomena or technical consequences of land change, but also as manifestations of a moral crisis that needs to be addressed with ethical correction. Fourth, the dialogue between scientific reason and theological reason opens up a space for normative reflection capable of guiding disaster prevention actions that are not only technical but also value-laden.

Consequently, this synthesis expands the meaning of the ecological crisis from a mere

empirical phenomenon toward a comprehensive ethical-spiritual understanding. The 2025 Aceh–Sumatra disaster, within this framework, becomes a call to not only restore the physical ecosystem but also to repair the moral relationship of humans with nature as an amanah.

CONCLUSION

The tragedy of flash floods and landslides that struck Aceh and the Sumatra region in late 2025 demonstrates that the environmental crisis cannot be understood solely as a natural event resulting from extreme rainfall. Various modern academic studies have indicated that upstream ecosystem destruction, deforestation, watershed degradation, and weak environmental governance play a significant role in magnifying the risks and impacts of disasters. Consequently, the ecological disaster is the outcome of a complex interaction between natural factors and human actions that are structural as well as systemic.

From the perspective of classical kalam, this phenomenon does not stand in a value vacuum. The tradition of Islamic theology views nature as part of a cosmic order created harmoniously and entrusted to humans as an amanah. The concepts of khalifah (stewardship), amanah (trust), and the prohibition of committing fasād fi al-arḍ (destruction on earth) assert that the human relationship with nature is ethical-theological, rather than merely economic or technical. Therefore, environmental degradation and the disasters that follow it cannot be detached from the crisis of human moral responsibility toward God's creation.

The synthesis between modern environmental science and classical kalam demonstrates that both complement each other. Modern science explains the empirical mechanisms of disaster occurrence, while classical kalam provides the normative framework to understand the ethical roots of such destruction. Through this integrative approach, the 2025 Aceh–Sumatra disaster can be understood not as a destiny to be accepted fatalistically, but rather as a warning of human failure to maintain the balance between the exploitation and preservation of nature.

Accordingly, this study confirms that the contemporary ecological crisis requires a multidisciplinary reading that relies not only on scientific data, but also on theological and ethical reflection. The classical kalam approach remains relevant in addressing modern environmental problems when it is read contextually and dialogically with science.

This study has limitations. Its empirical evidence rests on local Aceh studies and secondary disaster reports; it does not quantify the relative contribution of extreme rainfall, climate change, licensed concessions, mining, illegal logging, and spatial planning; and its kalam analysis is interpretive. Future research should combine watershed-level hydrological and remote-sensing data for the three provinces with a more systematic analysis of kalam sources.

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