



Verse Analysis on Water and Flood and Environmental Implementation in Disaster Mitigation in Aceh Tamiang, North Sumatra

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ABSTRACT

Flooding in Aceh Tamiang Regency is influenced by geographical conditions, rainfall, land-use change, river sedimentation, settlements in hazard-prone areas, and community behaviors that reduce environmental carrying capacity. This study aims to analyze the ecological meaning of Qur'an Surah Ar-Rum verse 41, identify flood risk factors, and formulate its implementation within community-based disaster mitigation. This study employed a descriptive qualitative method using a thematic interpretation approach. Data were collected through semi-structured interviews with six informants, observations, and documentation, and were analyzed using the Miles and Huberman model, including data reduction, data display, and conclusion drawing, while validity was ensured through source and technique triangulation. The findings reveal that the concept of *fasad* encompasses ecological, social, and governance degradation caused by human actions. Land-use conversion, the decline of water infiltration areas, settlements along riverbanks, low levels of community preparedness, and weak risk communication exacerbate flood risk. The implementation of the values embodied in Qur'an Surah Ar-Rum verse 41 is formulated through ecological prevention, enhanced preparedness, strengthened risk communication, and community collaboration in disaster mitigation. The scientific contribution of this study lies in the development of a flood mitigation model grounded in the ecological values of Qur'an Surah Ar-Rum verse 41, integrating religious, ecological, and community participation perspectives within a community-based disaster mitigation framework. Future studies should evaluate the effectiveness of this model using spatial and hydrological approaches across broader flood-prone areas.

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INTRODUCTION

Aceh Tamiang Regency is a low-lying area in Aceh Province that borders North Sumatra, with landscape characteristics in the form of river networks, developed settlements, and vulnerability to flooding. Floods not only cause physical damage but also affect health, sanitation, basic services, logistics, and community resilience. Therefore, flood mitigation in Aceh Tamiang needs to be understood as an effort that combines the moral message of the Qur'an, risk literacy, social preparedness, and strengthening local environmental governance. In this context, the reading of Q.S. Ar-Rum: 41 becomes relevant as the basis of Islamic ecological ethics, because the verse affirms that damage on land and sea is related to human actions (Muhammad Amin et al., 2025). The meaning of facades is not sufficiently understood

normatively, but needs to be linked to real ecological issues, such as land-use change, sedimentation, vulnerability of riverbank settlements, and waste management (Helmi et al., 2026).

A key gap arises when religious messages have not been systematically translated into collective behaviors and measurable mitigation mechanisms at the community level. The study of environmental ethics in the interpretation of Q.S. Ar-Rum: 41 emphasizes the importance of internalizing the value of human responsibility towards nature, but its implementation in the realm of local policies and citizen practices is often not discussed in detail (Yayah et al., 2024). As a result, people can understand the verse as general moral advice, but it lacks concrete and contextual guidelines for mitigation actions. Firmansyah's Research (2023) regarding "Ecological Sustainability of the Earth System: Classical and Contemporary Interpretation of Surah Ar-Rum (30), Verse 41" has also not entered the region-based operational level, so it has not explained how the value of sustainability is applied as a flood mitigation program specific to one district.

Rifzikka's research (2024) regarding the "Analysis Study of the Interpretation of Surah Ar-Rum Verse 41 on Environmental Damage and Its Relevance to the Threat of the Climate Crisis" focuses on the interpretation of Q.S. Ar-Rum: 41 by comparing classical and modern interpretations, then relating it to the issue of environmental damage and the threat of climate crisis. His main findings confirm that damage can be understood as a result of human behavior that impacts ecological imbalances. However, this study is still dominant at the global conceptual level, so it has not downgraded the concept of verse to a community-based flood mitigation strategy in the context of Aceh Tamiang. Research by Siregar et al. (2025) focusing on the environmental factors that trigger flash floods in Aceh Tamiang, thus providing an empirical basis for reading flood risk locally. The gap is that this research has not integrated the Quranic framework and religious values as an instrument for changing people's behavior in mitigation. Research by Munawarah and Maulidian (2022) photographing flood mitigation at the village level in Aceh Tamiang, including forms of preparedness and response of the local community. However, this study tends to describe mitigation practices without formulating a value framework that binds collective behavior.

Flood mitigation demands clear, fast, consistent, and reliable information. Research in Aceh Tamiang shows that the quality of inter-agency coordination influences public perception of mitigation communication, message clarity, and citizens' trust in disaster information sources. In addition to communication, preparedness is also determined by the community's ability to organize local resources. Risk reduction will be stronger when formal government strategies meet local practices within communities. Integrating the Q.S. Ar-Rum:41 value can serve as an ethical bridge, aligning local knowledge and technical policy toward the same goal: reducing vulnerability and stopping practices that exacerbate risks.

This study positions Q.S. Ar-Rum: 41 as the foundation of environmental and social ethics in flood mitigation in Aceh Tamiang. The purpose of this article is to analyze the Qur'anic verses on water and floods, especially Q.S. Ar-Rum: 41, as well as formulate their implementation in risk literacy, early warning, environmental governance, and community behavior change. Theoretically, this study enriches a more empirical thematic interpretation of the environment. It develops a conceptual framework that connects the concept of facades with the vulnerability, exposure, and capacity of society. Practically, this article is expected to

provide recommendations for local governments, BPBD, religious leaders, schools, and community members in strengthening flood mitigation in Aceh Tamiang.

METHODS

This study uses a descriptive qualitative method with a thematic interpretation approach (*Maudhu'i*) to analyze Q.S. Ar-Rum verse 41 and its relevance to community-based flood mitigation. (Arigundo, 1993; Nizhan, 2008). The research was carried out in Aceh Tamiang Regency because this area has a high level of flood vulnerability. The informants consisted of religious leaders, village officials, disaster workers, volunteers, and residents affected by the flood. Informants were selected by purposive sampling based on their experience and knowledge of flooding and mitigation, with a total of 6 people or until the data reached saturation.

The research instruments are in the form of semi-structured interview guidelines, observation sheets, and documentation. Data were collected through interviews, observations in flood-prone locations and preparedness activities, as well as documentation in the form of flood event data, maps, village archives, disaster procedures, and records of community activities. The validity of the data is checked through triangulation of sources and techniques. Data were analyzed using the Miles and Huberman model through data reduction, data presentation, and conclusion drawing (Miles & Huberman, 1994). The analysis was carried out by grouping data based on the theme of environmental damage, factors causing flooding, community behavior, preparedness, disaster communication, and the implementation of the value of Q.S. Ar-Rum verse 41 in flood mitigation in Aceh Tamiang.

RESULTS AND DISCUSSION

The Ecological Meaning of Q.S. Ar-Rum Verse 41 in the Context of Flood Disasters

Q.S. Ar-Rum verse 41 explains that the damage has been seen on land and sea due to human actions, so that humans feel some of the consequences of their actions and are encouraged to return to the right path. From an ecological perspective, this verse contains a cause-and-effect relationship between human actions, the disruption of the environmental balance, and the emergence of impacts that again threaten human life. Terms *Facade*: It not only points to moral and social damage, but also includes the destruction of natural functions, the decline in environmental quality, and the disruption of the systems that support life. A comparison of classical and contemporary interpretations shows an expansion of the meaning of *Facade* from social chaos to environmental degradation and climate crises influenced by human activities (Rifzikka, 2024).

Semantically, *Facade* describes a state when a system loses its proper order, balance, or function. The mention of land and sea in Q.S. Ar-Rum verse 41 shows that the scope of the damage is vast and interconnected. Land, rivers, coasts, seas, forests, and settlements are not separate systems, but one ecological unit. Damage to upstream areas, for example, can affect water flow, river sedimentation, downstream conditions, and flood vulnerability levels. Putri et al. (2025) affirms that, in this verse, it is a real consequence of the collective actions of humans on land and sea. This framework shows the existence of ecological relationships, environmental consequences, and human theological responsibility for the damage that occurs.

The phrase that links damage to "human handiwork" places humans as perpetrators who have the ability and responsibility to influence the environment. This does not mean that every disaster can be directly considered a punishment for the affected individual or society. Such an interpretation risks blaming the victim and ignoring the structural factors that make up vulnerability. This verse is more appropriately understood as a criticism of collective and systemic actions, such as resource exploitation, uncontrolled land clearing, pollution, development in vulnerable areas, and weak environmental management. Thus, ecological responsibility in Q.S. Ar-Rum verse 41 is not only individual, but also inherent in the government, business actors, social institutions, and society.

The ecological reading is in line with Islamic ecocriticism, which places the teachings of Islam as the basis for assessing the relationship between man and nature. In this perspective, human beings are not positioned as rulers who are free to exploit nature, but as caliphs who are limited by the principles of trust, balance, benefit, and the prohibition of doing damage. Nature has a value that is not solely determined by its usefulness to humans. Therefore, the responsibility of the caliphate must be translated into measures to protect land, water, forests, rivers, and living things. Abolfotoh (2021) shows that Islamic ecological thought can expand environmental studies by incorporating spiritual dimensions and moral responsibility into the reading of ecological crises.

The relevance of Q.S. Ar-Rum verse 41 to flooding can be explained through changes in the hydrological system due to human activities. Floods can indeed be triggered by high rainfall and topographic conditions. However, the severity is also affected by changes in land cover, reduced infiltration areas, soil compaction, narrowing of rivers, settlement development, and poor drainage systems. Studies on land use and cover change in Indonesia show that the conversion of forests into plantations, agricultural land, and settlements can reduce infiltration and increase surface runoff. These conditions accelerate the entry of water into the river and increase the likelihood of overflow when the flow capacity is no longer adequate (Pramono et al., 2026).

Floods also need to be distinguished between natural hazards and disasters. Extreme rainfall or overflowing rivers are hazards, while disasters are formed when they interact with people, settlements, infrastructure, and groups that have a certain level of vulnerability. Flood risk is the result of the relationship between danger, exposure, and vulnerability. Changes in land use, development in floodplains, population growth, and low preparedness capacity can increase risks even though the characteristics of rainfall are relatively similar. Rindsfuser et al. (2024) shows that the development of flood risk is not only determined by climate change, but also by human interventions and socioeconomic developments that alter people's levels of exposure and vulnerability.

Climate change amplifies hydrometeorological hazards through changes in rainfall patterns, increased extreme rainfall events, and changes in river discharge. Global projections suggest that rising temperatures could increase the frequency and exposure to flooding in several regions, including Southeast Asia (Hirabayashi et al., 2013). However, climate change cannot be used as the only explanation because the impact of flooding remains highly dependent on watershed conditions, spatial planning, environmental quality, and community capacity. In the framework of Q.S. Ar-Rum verse 41, climate change and floods can be read as

part of the cumulative consequences of human actions that disrupt the ecological balance, rather than as events completely separate from social and economic decisions.

In the context of Aceh Tamiang, the ecological meaning is important because people's lives are closely related to rivers, lowlands, residential areas, and land use changes. Research in Halban Bay Village shows that communities have undertaken several flood mitigation measures, but mitigation is not limited to responding when water begins to overflow. Mitigation needs to include the prevention of environmental damage, exposure reduction, protection of river spaces, and the formation of responsible collective behavior (Munawarah & Maulidian, 2022).

Based on this study, Q.S. Ar-Rum verse 41 does not serve as a technical explanation of the hydrological process, but as an ethical framework to assess the causes, responsibilities, and consequences of environmental damage. The façade concept shows that floods cannot always be understood as a purely natural event. The impact can be magnified by human choices in managing forests, land, rivers, waste, settlements, and development. The message of "get them back" contains a corrective orientation: to stop destructive actions, restore ecosystem function, and build more responsible governance. Thus, the ecological meaning of Q.S. Ar-Rum verse 41 provides a normative basis for linking religious awareness with environmental science and disaster risk reduction.

Flood Risk Factors in Aceh Tamiang in the Perspective of Q.S. Ar-Rum Verse 41

Flood risk does not arise from a single cause, but from the interaction between hydrometeorological hazards, environmental conditions, regional exposure, and community vulnerability. High rainfall and river overflow directly trigger the flood, while changes in land cover, development in vulnerable areas, decreased river capacity, and low preparedness determine the magnitude of the impact. Therefore, the flood in Aceh Tamiang is inadequate if it is only explained as a natural phenomenon. Floods need to be understood as the result of a meeting between the geographical character of the area and human decisions in managing space and the environment.

Geographically, flood vulnerability in Aceh Tamiang is influenced by lowland conditions, river networks, rainfall, slope, soil type, land use, and river flow density—mapping based on geographic information systems conducted by Alifa et al. (2025) Five main variables were used, namely slope, soil type, rainfall, land use, and river network density. The results of the study show that the level of flood vulnerability in Aceh Tamiang differs between regions because each region has a combination of different physical factors and land use. These findings confirm that topographic and hydrological conditions are the basis of vulnerability, but the level of risk is also influenced by the way humans use land.

High rainfall serves as a major hydrometeorological trigger, but it is not always the sole cause of increased flooding. The ability of soil and vegetation to absorb, store, and release water gradually greatly determines the amount of surface runoff that enters the river. If the catchment area is reduced, rainwater flows faster into channels and rivers so that peak discharge increases in a short time. This condition is even more risky in lowland areas with small slopes because water tends to be held for longer and is difficult to flow to lower areas.

Changes in land use and cover are one of the important anthropogenic factors in the formation of flood risk. Research by Pramono et al. (2026) shows that the transformation of

forests into plantations, agricultural land, and settlements has changed the hydrological function of various watersheds in Indonesia. Such conversions tend to decrease infiltration, reduce groundflow, and increase surface runoff. The transformation of forests into oil palm plantations can also compact the soil, reducing the soil's ability to absorb water. Meanwhile, the conversion of agricultural land into settlements expands the watertight surface and accelerates the flow of water to drainage and rivers.

In the context of Aceh Tamiang, land use change needs to be read along with river sedimentation, deforestation, sand mining, and settlement development on the riverbanks. Research by Rajib et al. (2026) identifies high rainfall, sedimentation, land conversion, illegal logging, sand mining, development of riverbank settlements, and low environmental awareness as factors related to flooding in Aceh Tamiang. However, the study uses a normative juridical approach based on literature studies. Therefore, the findings are relevant as an initial identification, but not enough to quantitatively determine the magnitude of the influence of each factor on discharge or inundation area.

River sedimentation increases the risk of flooding because it reduces the area and depth of the flow cross-section. Sediments derived from land erosion, vegetation clearing, construction activities, and disturbances at river boundaries can accumulate in river bodies. When the river's capacity decreases, discharge that was previously still flowable can overflow. Uncontrolled sand mining can also alter the morphology of the river bed and banks. The impact is not always in the form of direct siltation, but it can trigger cliff instability, changes in current direction, local erosion, and damage to river ecosystems. Therefore, flood management needs to be carried out on a watershed scale, not only through dredging at inundation sites.

Spatial planning factors magnify the risk when development does not consider the natural functions of floodplains. The construction of houses, roads, public facilities, and business areas on the borders of rivers or lowlands increases the number of people and assets exposed. The surface of the soil that previously absorbed water turned into roofs, concrete, and road pavement. In addition to increasing runoff, the arrangement of buildings and road networks can affect the direction, depth, and speed of flood flow. Balaian et al. (2024) shows that density, regularity, porosity of built-up areas, soil slopes, and building configurations can form flow concentration patterns at environmental scales. This means that the risk of flooding is not only determined by the area of settlements, but also by the physical shape of the area and its position in the waterway.

The growth of settlements in vulnerable areas also increases the value of assets and the number of people exposed to floods. Hemmati et al. (2020) explained that the growth of urban areas can reduce community resilience when development expansion is not followed by flood protection, land use planning, and infrastructure capacity building. This means that spatial planning not only relates to the physical causes of inundation, but also determines how much social and economic loss occurs when flooding occurs. In the context of Aceh Tamiang, controlling the use of river boundaries, protecting catchment areas, and adjusting settlement patterns are important parts of risk reduction.

Community behavior factors can affect flood risk through two pathways. First, behavior that damages the environment can increase danger, for example, waste disposal into canals and rivers, land clearing without soil conservation, removal of border vegetation, and the use of space that is not in accordance with the environment's carrying capacity. Second, a lack of

understanding of risks can increase vulnerability, such as ignoring early warnings, not preparing evacuation routes, not protecting documents and necessities, and moving late to a safe location. Thus, behavior is not only related to environmental cleanliness, but also to the community's ability to anticipate and respond to threats.

Aksa and Sinulingga Research (2022) In the communities affected by the flash flood in Baborok, research shows that disaster experience and risk perception are related to community preparedness. However, the experience of dealing with repeated floods does not automatically result in adequate preventive measures. The public can consider floods a routine event, so the level of vigilance actually decreases. This condition shows that knowledge about hazards must be accompanied by the ability to act, access to information, household resources, and trust in disaster institutions.

Findings of Rachmawati et al. (2026) It also shows that perception, awareness, access to information, and household vulnerability characteristics affect flood preparedness behavior. Groups that are aware of the risks do not necessarily take protective measures when faced with economic limitations, information, social support, or technical capabilities. Thus, low preparedness is inappropriate if it is solely considered as an individual fault. Preparedness is also influenced by the quality of risk communication, clarity of role sharing, availability of evacuation facilities, and government and community support.

From the perspective of Q.S. Ar-Rum verse 41, these factors can be understood through the concept of facade. The term facade refers to a condition in which an order is damaged, deviated, or loses its function due to human actions. Damage is not limited to visible pollution, but includes disruption of relationships between land, rivers, forests, settlements, and social life. Forest clearing, development on river borders, resource exploitation, waste disposal, and risk abandonment are all actions that can reduce the ability of ecosystems to carry out their protective functions. The ecological reading of Q.S. Ar-Rum verse 41 thus links physical damage to human moral and social responsibility (Rifzikka, 2024).

The façade concept is also relevant for assessing failures at the governance level. Environmental damage does not always come from individual community actions. However, it can be shaped by uncontrolled land-use policies, weak oversight, permitting that ignores carrying capacity, and inconsistent enforcement of environmental regulations. This perspective prevents interpretations that simplify flooding as punishment for affected communities. Q.S. Ar-Rum verse 41 is more appropriately used as an ethical criticism of actions and systems that produce damage and increase the vulnerability of society.

Based on the literature, the dominant factors of flood risk in Aceh Tamiang can be grouped into three. *First, environmental factors in the form of high rainfall, lowland conditions, river density, sedimentation, and declining infiltration area function. Second, spatial planning factors in the form of land use changes, the development of riverbank settlements, the increase in watertight surfaces, and weak development control in vulnerable areas. Third, behavioral and institutional factors in the form of practices that damage the environment, low preparedness, weak risk communication, and suboptimal supervision and enforcement of rules.*

The available evidence has not allowed the determination of one factor that is absolutely the most dominant because some studies of Aceh Tamiang are still spatial, descriptive, or literature studies. However, existing studies show that rain is a trigger, while changes in land use and inaccurate spatial use are anthropogenic factors that increase runoff, exposure, and

losses. Community behavior and governance weaknesses further increase vulnerability. From the perspective of Q.S. Ar-Rum verse 41, this connection shows that floods are both ecological and social problems: natural hazards become heavier disasters when humans reduce the environment's carrying capacity and fail to control the use of space.

Implementation of the Value of Q.S. Ar-Rum Verse 41 in Community-Based Flood Mitigation

Q.S. Ar-Rum verse 41 places environmental damage as a consequence of human actions while calling for behavior change. In the context of flood mitigation, the message is not enough to be understood as a moral imperative. However, it needs to be translated into ecological responsibility that can be implemented through prevention, preparedness, risk communication, and community collaboration. This approach transforms the passive and fatalistic understanding of disasters into the realization that humans have an obligation to recognize risks, prevent damage, and mitigate the impact of disasters. Düsseldorf (2022) shows that the interpretation of the Qur'an can be operationalized through a friendly attitude with nature, the use of science, and preventive mitigation measures.

This meaning is important because religious teachings in disaster-affected communities are sometimes used more to explain acceptance after a disaster than to build preparedness before a disaster. Adioso and Kanegae (2013) found that the religious message in Banda Aceh was still dominant in placing disaster as God's will, test, or warning. Nevertheless, the community still believes in the importance of making preparations. The findings suggest that religious values need to be directed towards reinforcing preventive measures, rather than being used as an excuse to accept risk passively.

The first implementation is ecological responsibility-based prevention. Prevention is carried out by stopping actions that increase runoff and reduce the environment's ability to retain water. The form includes protecting infiltration areas, maintaining vegetation in watersheds, rehabilitating river boundaries, controlling development in vulnerable areas, managing waste, and maintaining waterways. This action is a form of correction to the *façade* because it seeks to restore the function of soil, rivers, and vegetation as a water-regulating system.

Ecological prevention can be strengthened through nature-based solutions combined with technical infrastructure. Forest protection, riparian vegetation, retention ponds, open spaces that absorb water, and porous surfaces can help slow runoff and reduce the impact of flooding. Lallemand et al. (2021) shows that ecosystem protection and forest cover can provide real benefits in reducing flood risk. However, its implementation requires adjustments to the character of the region and the involvement of many parties because land use often intersects with the interests of the community, the government, and landowners (Davids et al., 2024).

In the context of Aceh Tamiang, ecological prevention can be carried out through activities that are close to people's lives, such as cooperation in cleaning channels, monitoring waste disposal, planting border vegetation, reporting river damage, and mapping inundation locations. Research in Halban Bay Village shows that the community has taken several mitigation measures, including cleaning waterways, finding evacuation routes, monitoring information, securing documents, and heading to higher places when floods occur (Munawarah

& Maulidian, 2022). These practices can be developed from household actions into village programs that are scheduled, measurable, and connected to local governments.

The second implementation is to strengthen community preparedness. Preparedness includes knowledge of vulnerable areas, recognition of danger signs, determination of evacuation routes and locations, formation of standby groups, evacuation exercises, provision of logistics, and protection of vulnerable groups. The value of "so that man returns" in Q.S. Ar-Rum verse 41 can be interpreted as a process of evaluation and change after man understands the consequences of damage. In the context of disasters, these changes are realized by learning from previous floods and improving community capacity before the next flood.

Preparedness is not enough to be built through one-way socialization. Communities need to be involved in identifying hazards, compiling risk maps, establishing evacuation routes, determining evacuation locations, and evaluating emergency response procedures. Wolff (2021) Demonstrated that a community-centered approach can improve risk knowledge, communication, and social capital when citizens are directly involved in flood monitoring. Thus, the community is not only a recipient of information, but also a producer of knowledge based on local experience and observation.

Religious leaders have a strategic position in shaping preparedness because they have social legitimacy and direct access to the community. Fatimahsyam (2024) shows that scholars in Aceh play a role in changing people's views from passive attitudes towards destiny towards active, participatory, and organized risk reduction. In Aceh Tamiang, imams and *teungku* can integrate mitigation messages into sermons, recitations, religious education, and community gatherings. The material contains not only the prohibition of destroying nature, but also specific actions such as guarding rivers, following early warnings, helping vulnerable groups, and adhering to evacuation procedures.

The use of religious values will be more effective when combined with local knowledge. The community has experience regarding changes in color and water height, rainfall patterns, flow directions, inundation points, safe paths, and houses that can be used as temporary shelters. Rozi et al. (2021) show that integrating religious values and local wisdom can strengthen social cohesion and make community-based disaster management more practical and in accordance with the character of the community. However, local knowledge still needs to be verified with technical data so as not to produce erroneous decisions when flood patterns change.

The third implementation is to strengthen disaster communication. Early warning is only effective if the message is received, understood, trusted, and immediately followed by action. The message should describe the threat level, potentially affected areas, time of occurrence, actions to take, evacuation locations, and official sources of information. Information that is too general or capricious can cause confusion and lower public trust. Kammerbauer and Minnery (2019) emphasized that risk information needs to be tailored to the local context and must consider how communities interpret environmental warnings and signs.

Trust in the message conveyor is a key element of risk communication. The village government and BPBD have formal authority, while religious leaders, volunteers, hamlet heads, and neighbors have social closeness to residents. Seebauer and Babcicky (2018) explained that governments, volunteers, and citizen networks have different roles in forming trust and encouraging preparedness actions. Therefore, flood communication in Aceh Tamiang

should use a layered model, namely technical information comes from the authorities, then is redistributed through trusted local actors.

Digital communication also needs to be managed because the public obtains information not only from the government, but also from citizens' content on social media. Agustina et al. (2026) found a difference in framing between residents' content and the government's clarification in the Aceh Tamiang flood information. Citizen content can provide field reports quickly, but it risks generating unverified information. On the other hand, government information is more official, but it can lose relevance if it is late or does not respond to the conditions felt by the public. Principle *Tabayyun* can be implemented by requiring the examination of the source, location, time, and conditions before information is forwarded.

Early warning systems need to integrate institutional and community capacities. Henao Salgado et al. (2025) explain the four main elements of an early warning system, namely risk knowledge, monitoring and forecasting, warning deployment, and responsiveness. Integration can be done through the use of water height measuring instruments, river observer reports, village communication groups, mosque loudspeakers, sirens, radios, and mobile phone messages. Citizen observation can expand the scope of monitoring, but alert decisions must have clear procedures and authoritative sources so that conflicting messages do not appear.

The fourth implementation is community collaboration. Flood mitigation cannot be left entirely to BPBD or village governments because most of the prevention and initial response takes place at the household and environmental levels. Collaboration needs to involve local governments, BPBD, village governments, religious leaders, schools, volunteers, women's groups, youth, business actors, and affected communities. The division of roles must be established from the pre-disaster phase so that cooperation is not only formed when an emergency occurs.

Collaboration depends on social capital in the form of trust, networks, cooperation norms, and the community's ability to organize resources. Waseem et al. (2024) found that social capital plays a role in shaping risk perceptions, capacity building, flood response, and community recovery. However, local social capital should not be used as an excuse for the government to reduce its responsibilities. Community networks complement state capacity, especially in reaching groups that have difficulty receiving information or assistance.

Based on the synthesis of literature, the implementation of Q.S. Ar-Rum verse 41 in Aceh Tamiang can be formulated through four pillars. The prevention pillar emphasizes restoring environmental function and stopping actions that increase risk. The preparedness pillar emphasizes education, participatory mapping, simulation, logistics, and protection of vulnerable groups. The communication pillar prioritizes information that is fast, clear, verified, and delivered through trusted sources. The collaboration pillar integrates the roles of the government, BPBD, religious leaders, schools, volunteers, and residents into a single village mechanism.

The framework shows that the application of Q.S. Ar-Rum verse 41 does not stop at delivering lectures on the destruction of nature. Verse values need to be transformed into social norms, responsibility sharing, routine activities, and mitigation procedures that can be evaluated. Its success can be assessed through concrete indicators, such as reduced litter in rivers, protected borders, availability of maps and evacuation routes, increased simulation participation, speed of warning deployment, and involvement of vulnerable groups. Thus,

religious awareness serves as a driver of collective action to prevent *disasters*, strengthen community capacity, and reduce the risk of flooding in Aceh Tamiang.

CONCLUSION

This research shows that Q.S. Ar-Rum verse 41 contains an ecological meaning that affirms the relationship between human behavior, damage to environmental systems, and increased risk of hydrometeorological disasters. The concept *offaçade* not only refers to moral damage, but also includes forest degradation, land use change, river sedimentation, narrowing of catchment areas, development in vulnerable areas, poor waste management, and weak environmental governance. In Aceh Tamiang, rainfall and lowland conditions are natural triggers, while changes in land use, riverbank settlements, low preparedness, and weak communication risk increasing community exposure and vulnerability. This finding expands on the previous environmental interpretation study by translating the normative message of Q.S. Ar-Rum verse 41 into four pillars of community-based mitigation, namely ecological prevention, strengthening preparedness, clear and trusted disaster communication, and collaboration between the government, BPBD, religious leaders, volunteers, schools, and residents.

Socially and culturally, the involvement of imams or *teungku*, the value of cooperation, *the principle of tabayyun*, and local knowledge can strengthen the acceptance and sustainability of mitigation programs. Academically, this research connects thematic interpretation with the concepts of danger, exposure, vulnerability, and community capacity so that religious values can be positioned as an ethical basis as well as a driver of collective action. However, this study is limited to a qualitative approach with six informants. It has not quantitatively measured the influence of each risk factor or the effectiveness of the formulated mitigation model. Future research needs to involve a wider range of areas and informants, use spatial and hydrological analysis, and test the application of the four pillars through participatory research or program evaluation in flood-prone villages in Aceh Tamiang.

REFERENCES

- Abolfotoh, I. Samy. (2021). Islam ecocriticism : Green Islam Introduced to Ecocriticism. *ISLE: Interdisciplinary Studies in Literature and Environment*, 28(4), 1371–1390. <https://doi.org/10.1093/isle/isaa139>
- Adiyoso, W., & Kanegae, H. (2013). The Preliminary Study of the Role of Islamic Teaching in the Disaster Risk Reduction (A Qualitative Case Study of Banda Aceh, Indonesia). *Procedia Environmental Sciences*, 17, 918–927. <https://doi.org/10.1016/j.proenv.2013.02.110>
- Agustina, A., Laila, A. F., Prasyawan, E., & Ginting, R. (2026). Informasi Banjir di Aceh Tamiang: Citizen–Generated Content Versus Klarifikasi Pemerintah. *Jurnal Indonesia : Manajemen Informatika Dan Komunikasi*, 7(1), 178–187. <https://doi.org/10.63447/jimik.v7i1.1782>
- Aksa, F. I., & Sinulingga, E. (2022). Risk Perception and Preparedness in Flash Flood-Affected Communities: Evidence from Bahorok, Indonesia. *Geosfera Indonesia*, 7(1), 61. <https://doi.org/10.19184/geosi.v7i1.28645>
- Arikunto, S. (1993). *Prosedur Penelitian: Suatu Pendekatan Praktek*. Rineka Cipta.
- Balaian, S. K., Sanders, B. F., & Abdolhosseini Qomi, M. J. (2024). How urban form impacts flooding. *Nature Communications*, 15(1), 6911. <https://doi.org/10.1038/s41467-024->

50347-4

- Danarta, A. (2022). The Implementation of Disaster Mitigation based on Qur'anic Interpretation: Muhammadiyah Case Study. *Jurnal Studi Ilmu-Ilmu Al-Qur'an dan Hadis*, 23(1), 125–144. <https://doi.org/10.14421/qh.2022.2301-07>
- Davids, P. R., Hartmann, T., Ferreira, C. S. S., Kalantari, Z., & Pereira, P. (2024). Multi-, inter-, and transdisciplinary approaches to nature-based flood risk management. *Current Opinion in Environmental Science & Health*, 38, 100537. <https://doi.org/10.1016/j.coesh.2024.100537>
- Fatimahsyam, F. (2024). Islam and Disaster Risk Reduction: The Role of Local Religious Leaders in Transforming Communities in Gampong Deah Glumpang, Banda Aceh. *SINTHOP: Media Kajian Pendidikan, Agama, Sosial Dan Budaya*, 3(2), 77–86. <https://doi.org/10.22373/sinthop.v3i2.6144>
- Firmansyah, A., Nugraheni, Y. T., Wisanto, M., & Asih, S. W. (2023). The Ecological Sustainability of The Earth System: Classical and Contemporary Interpretation of Surah Ar-Rum (Chapter 30), Verse 41. *Amorti: Jurnal Studi Islam Interdisipliner*, 160–166. <https://doi.org/10.59944/amorti.v2i3.108>
- Helmi, F., Nurhakim, I., & Munawar, A. (2026). Qur'anic Ecotheology as Environmental Critique: Reinterpreting Fasad fi al-Ard in QS. Ar-Rum [30]: 41 in Extractive Economic Practices. *QiST: Journal of Quran and Tafseer Studies*, 5(1), 201–222. <https://doi.org/10.23917/qist.v5i1.15973>
- Hemmati, M., Ellingwood, B. R., & Mahmoud, H. N. (2020). The Role of Urban Growth in Resilience of Communities Under Flood Risk. *Earth's Future*, 8(3). <https://doi.org/10.1029/2019EF001382>
- Henao Salgado, M. J., Alfonso, L., & Vélez Upegui, J. J. (2025). Towards integrating community and institutional flood early warning systems: A framework applied to an Andean tropical case. *International Journal of Disaster Risk Reduction*, 116, 105126. <https://doi.org/10.1016/j.ijdr.2024.105126>
- Hirabayashi, Y., Mahendran, R., Koira, S., Konoshima, L., Yamazaki, D., Watanabe, S., Kim, H., & Kanae, S. (2013). Global flood risk under climate change. *Nature Climate Change*, 3(9), 816–821. <https://doi.org/10.1038/nclimate1911>
- Kammerbauer, M., & Minnery, J. (2019). Risk communication and risk perception: lessons from the 2011 floods in Brisbane, Australia. *Disasters*, 43(1), 110–134. <https://doi.org/10.1111/disa.12311>
- Lallemant, D., Hamel, P., Balbi, M., Lim, T. N., Schmitt, R., & Win, S. (2021). Nature-based solutions for flood risk reduction: A probabilistic modeling framework. *One Earth*, 4(9), 1310–1321. <https://doi.org/10.1016/j.oneear.2021.08.010>
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Muhammad Amin, M. Khidri Rahmad Dini, Muhammad Hafy Zaky, & Ahmad Mujahid. (2025). Konsep Air Sebagai Sumber Kehidupan Dalam Al-Qur'an. *AT-TAISIR: Journal of Indonesian Tafsir Studies*, 6(1), 82–98. <https://doi.org/10.51875/attaisir.v6i1.579>
- Munawarah, R., & Maulidian, M. O. R. (2022). Mitigasi Bencana Banjir Di Desa Teluk Halban, Kecamatan Bendahara, Kabupaten Aceh Tamiang. *Jurnal Pendidikan Geosfer*, 7(1), 85–94. <https://doi.org/10.24815/jpg.v7i1.23700>
- Nizhan, A. (2008). *Buku Pintar Al-Quran*. QultumMedia.
- Nur Alifa, S., Zalmita, N., Yulianti, F., & Furqan, M. H. (2025). Pemanfaatan Sistem Informasi Geografis Dalam Pemetaan Lokasi Rawan Banjir Di Kabupaten Aceh Tamiang. *PESHUM: Jurnal Pendidikan, Sosial dan Humaniora*, 4(5), 8138–8147. <https://doi.org/10.56799/peshum.v4i5.10090>
- Pramono, I. B., Basuki, T. M., Santosa, B. H., Nugroho, H. Y. S. H., Pratiwi, Purwanto, E., &

- Narendra, B. H. (2026). Hydrological consequences of land use/land cover change in Indonesia: Impacts, trends, and disaster mitigation. *Trees, Forests and People*, 25, 101291. <https://doi.org/10.1016/j.tfp.2026.101291>
- Putri, L. D. F., Ahmadi, B. Z. R., & Aulia', K. K. (2025). Membaca Krisis Lingkungan Melalui Lensa Tafsir Ekologi: Analisis QS. al-Rūm [30]: 41. *Canonica Religia*, 3(1), 35–48. <https://doi.org/10.30762/cr.v3i1.3143>
- Rachmawati, F., Susilawati, C., Teo, M., Saja, A. M. A., Devi, B., Soemitro, R. A. A., Wilkinson, S., & Goonetilleke, A. (2026). Flood risk perception, awareness, and preparedness behaviours among vulnerable population groups: implications for building community resilience. *Disasters*, 50(1). <https://doi.org/10.1111/disa.70029>
- Rajib, R. K., Pebriyani, A., & Yunita, A. D. (2026). Efektivitas penegakan hukum lingkungan hidup terhadap aktivitas manusia yang menyebabkan banjir: Studi kasus di Aceh Tamiang. *Jejak Digital: Jurnal Ilmiah Multidisiplin*, 2(3), 4427–4438. <https://indojurnal.com/index.php/jejakdigital/article/view/2884>
- Rifzikka, S. A. (2024). Studi Analisis Tafsir Surah Ar-Rum Ayat 41 Tentang Kerusakan Lingkungan. *Journal of Islamic Studies and Humanities*, 9(2), 254–298. <https://doi.org/10.21580/jish.v9i2.23659>
- Rindsfuser, N., Zischg, A. P., & Keiler, M. (2024). Monitoring flood risk evolution: A systematic review. *IScience*, 27(9), 110653. <https://doi.org/10.1016/j.isci.2024.110653>
- Rozi, S., Ritonga, A. R., & Januar, J. (2021). 'Local community-based disaster management' The transformation of religious and local wisdom values in preparation to deal with natural hazards in West Sumatra, Indonesia. *Jambá - Journal of Disaster Risk Studies*, 13(1). <https://doi.org/10.4102/jamba.v13i1.1020>
- Seebauer, S., & Babicky, P. (2018). Trust and the communication of flood risks: comparing the roles of local governments, volunteers in emergency services, and neighbours. *Journal of Flood Risk Management*, 11(3), 305–316. <https://doi.org/10.1111/jfr3.12313>
- Siregar, P. F., Sinurat, D. A., & Yosantia, M. F. (2025). Identifikasi Faktor Lingkungan yang Menyebabkan Banjir Bandang di Kabupaten Aceh Tamiang. *Jurnal Media Teknik Sipil Samudra*, 6(2), 13–19.
- Waseem, H. Bin, Mirza, M. N. E. E., & Rana, I. A. (2024). Exploring the role of social capital in flood risk reduction: Insights from a systematic review. *Environmental Impact Assessment Review*, 105, 107390. <https://doi.org/10.1016/j.eiar.2023.107390>
- Wolff, E. (2021). The promise of a “people-centred” approach to floods: Types of participation in the global literature of citizen science and community-based flood risk reduction in the context of the Sendai Framework. *Progress in Disaster Science*, 10, 100171. <https://doi.org/10.1016/j.pdisas.2021.100171>
- Yayah, Ghianovan, J., & Ash, A. (2024). Environmental Ethics in Tafsir of the Qur'an (Study of Surah Ar-Rum Verse 41 Quraish Shihab's perspective). *Riwayat: Educational Journal of History and Humanities*, 7(3), 1223–1231. <https://doi.org/10.24815/jr.v7i3.40090>