



Islam, Land, and Local Knowledge in Acehnese and Sasak Novel: A Cultural Ecossemiotic Perspective on Narratives Environmental Guardianship in Muslim Communities

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Abstract. This study explores the intersection of Islam, indigenous ecological knowledge, and environmental narratives in Muslim communities through a cultural ecossemiotic analysis of two contemporary Indonesian novels: *Raifa dalam Dekapan Selembu* by Boy Abdaz and *Sanggarguri* by Lalu Agus Fathurrahman. The novels represent two major Islamic cultural communities in Indonesia—Acehnese and Sasak—whose relationship with nature is mediated by local wisdom and religious values. Using a cultural ecossemiotic lens, this study examines how signs, symbols, and cultural codes embedded in the narratives reflect the communities' environmental ethics and cosmologies. Findings reveal that the novels construct a layered understanding of environmental guardianship rooted in Islamic teachings, indigenous traditions, and socio-ecological memory. Raifa portrays the sacredness of forested Selembu hills as intertwined with sharia-based communal responsibilities, while *Sanggarguri* frames the preservation of water, land, and Rinjani Mountain in Lombok within the Sasak-Islamic worldview. These literary narratives offer a rich source of culturally responsive material for science education in Islamic contexts, particularly in promoting STEM learning that values local knowledge and sustainability. The study concludes that integrating fiction grounded in local Muslim communities into science education can foster ecological literacy, reinforce cultural identity, and support context-sensitive pedagogical innovation. This research contributes to broader conversations on Islam, literature, and environmental education, proposing literary texts as vehicles for embedding indigenous ecological insights into culturally inclusive STEM curricula.

Keywords: Islamic Indigenous Knowledge, Environmental, Cultural Ecossemiotics.

1 Introduction

Environmental degradation continues to be one of the most pressing global challenges of the 21st century, prompting educators, policymakers, and society to rethink the role of knowledge, culture, and education in promoting sustainability [1], [2], [3]. Among the efforts to address this crisis, there is a growing recognition of the value of indigenous and local knowledge systems especially, those embedded in religious and cultural traditions, in shaping a more inclusive and contextualized approach to science education [4], [5].

The integration of local and indigenous knowledge into science education has become a major discourse in culturally responsive pedagogy, particularly in societies where religious and cultural identities shape ecological perspectives. In Muslim-majority societies, ecological ethics are often based on a synthesis of Islamic teachings and local traditions, forming a unique body of knowledge that is both spiritual and ecological in nature [6], [7]. This knowledge is not only transmitted orally or through customary practices, but is also embedded in cultural narratives, including literature.

Globally, culturally responsive STEM education has emerged as a transformative framework for integrating learners' sociocultural identities and ecological worldviews into curriculum design and pedagogical practices [8]. Aikenhead and Michell argue that such approaches are particularly relevant in communities where scientific understanding is not separate from belief systems and environmental ethics, but integrated through symbols, stories, and spiritual practices [9]. In the Islamic context, ecological stewardship (*khalifah fil-ardh*) and the sacredness of nature are firmly rooted in Qur'anic principles and further contextualized through local customs and narratives [10], [11].

Indonesia, home to the world's largest Muslim population, presents a rich fabric of Islamic ecological wisdom. Among its diverse cultures, the people of Aceh and Sasak (Lombok) exemplify how Islamic values intersect with indigenous environmental practices [12], [13], [14], [15]. Literary texts such as *Raifa dalam Dekapan Selembu* by Boy Abdaz represent the Acehnese in conserving nature based on local wisdom, while the novel *Sanggarguri* by Lalu Agus Fathurrahman is a narrative platform through which environmental stewardship is articulated by the Sasak people of Lombok. These works illustrate how forest conservation, water management, and land ethics are maintained through local religio-cultural frameworks.

In many Muslim communities, land is not merely physical territory, but a sacred trust (*amanah*) endowed by God, carrying both spiritual and cultural meanings. It is perceived as a living entity with memory, history, and moral obligations [16], [17]. Surah Al-A'raf verse 58 and Surah Thaha verse 53 in the Quran, for example, explain about soil, highlighting its creation, its function for life, and the importance of protecting it. Land is referred to as the expanse on which humans live and move, as well as the basic material of human creation. In addition, the Quran also emphasises that humans were created from soil and it is recommended not to do damage on the earth.

In Acehnese and Sasak societies, land is deeply woven into systems of belief, oral traditions, and customary law (*hukum adat*), often linked with religious observances and communal rituals. Land becomes the axis of ecological ethics, identity formation, and resistance against exploitation. Literature from these communities captures this

deep ontological and spiritual relationship with land, portraying it not only as a source of livelihood but also as a symbol of divine order and collective heritage. However, the educational potential of these texts, particularly in the context of culturally responsive STEM education, remains underexplored.

Academic research on the role of literary narratives in representing this local Islamic environmental knowledge and its potential for integration into science education is underdeveloped. While research on the Islamic environment [18], [19], and indigenous knowledge in the curriculum [20], [21] continues to grow, few have investigated literature as a medium for transmitting culturally embedded ecological values relevant to STEM learning.

To address this gap, this study adopts a cultural ecosemiotics perspective, which examines how ecological signs, symbols, and meanings operate within cultural and narrative contexts [22], [23], [24], [25]. By analysing the ecosemiotic structures in both novels, this study aims to uncover how local Muslim communities construct environmental knowledge and how such narratives can inform contextual science curriculum development. As such, it contributes to an emerging conversation in environmental humanities, Islamic education, and science pedagogy that prioritises cultural relevance and ecological sustainability [26].

The novelty of this research lies in the interdisciplinary relationship between ecosemiotics, Islamic environmental ethics, and culturally responsive science education. By examining how indigenous Islamic ecological knowledge is narrated in fiction, this study seeks to propose literary texts as pedagogical tools for STEM educators that aim to localise scientific content and foster environmental literacy. The findings are expected to contribute to a broader discourse on culturally inclusive pedagogy, indigenous Islamic perspectives in science, and the role of literature in environmental education.

2 Method

This study uses a qualitative interpretive design with a cultural ecosemiotics approach to analyse narrative texts that represent indigenous Islamic ecological knowledge. Cultural ecosemiotics allows the exploration of how signs, symbols, and meanings related to nature are culturally constructed in literary texts and how they reflect the broader ecological worldview of Muslim communities [27], [28].

The primary data sources are two Indonesian novels that raise the theme of environmental protection carried out by local communities based on Muslim communities: *Raifa dalam Dekapan Selembu* by Boy Abdaz (Acehnese context) [29] and *Sang-garguri* by Lalu Agus Fathurrahman (Sasak Lombok context) [30]. These texts were purposively selected based on their cultural representations, ecological themes, and ethical-religious underpinnings. Each novel is analysed as a cultural artefact that instills local Islamic environmental values.

Data analysis followed three interrelated procedures. First, a textual ecosemiotic reading was conducted. This is done by identifying ecological signs, nature-related metaphors, religious references, and cultural symbols. Secondly, contextual interpretation. This stage is done by mapping the cultural, religious, and environmental significance

of these signs in relation to the Acehnese and Sasak worldviews. Third, thematic abstraction. This stage is done by synthesising the ecological narratives into categories relevant to science education, such as environmental ethics, resource management, and spiritual ecology. This framework was adapted from Lotman's theory of cultural semiotics [31], combined with the principles of ecosemiotics developed by Kull [32] and Nöth [33], specifically focusing on the function of cultural boundaries in mediating nature. To ensure the credibility of the interpretations, this research employs triangulation through literature review, intertextual cross-checking, and cultural contextualisation.

3 Result and Discussion

3.1 Land as Sacred Trust: Ecosemiotic Construction of *Amanah* in Muslim Narratives

Land is represented as a sacred trust (*amanah*) in both *Raifa dalam Dekapan Selembu* and *Sanggarguri*. Through forest rituals, communal prayers, and narrative conflict over land use, the novels foreground land not as a passive resource but as a moral and spiritual entity entrusted by God. In *Raifa*, the hills of Selembu are portrayed as both sacred and threatened, invoking Quranic cosmology and Acehnese cultural memory. Meanwhile, in *Sanggarguri*, Sasak adat integrates Islamic values in preserving agricultural and ritual lands, reflecting a semiotic layering of religious ethics and indigenous epistemology.

The novel *Raifa dalam Dekapan Selembu* by Boy Abdaz represents Acehnese people in ecological awareness and local wisdom in maintaining natural balance. Through the story of Raifa and her family, the importance of protecting the environment can be interpreted. The novel describes their attachment to tradition, nature, and spiritual beliefs that have been passed down from generation to generation. The people around the slopes of Mount Selembu not only understand nature as a source of livelihood, but also as an entity that has consciousness and must be respected.

The land, mountains, forests, and rivers are considered the abode of ancestral spirits that maintain the balance of life. Therefore, any disturbance to nature is often associated with spiritual consequences that humans must face. This is evident in the various rituals and customs performed by the Acehnese, whether to invoke protection, mitigate disasters, or maintain harmony with nature. Traditional rituals, prayers, and belief in natural omens are part of the community's coping strategy in the face of external changes and threats. This can be seen in the following text data.

The women were busy filling goat curry into bowls and then arranging them in a row. Others were pouring water into buckets for the washbasin. In the corner, some old women just sat and listened solemnly to Latif's messages.

Kenduri Turun' is an annual event that begins all activities (Abdaz, 2021, p. 177).

The text data of Boy Abdaz's novel *Raifa dalam Dekapan Selembu* shows a traditional ritual known as *Kenduri Turun*, an annual tradition that is the beginning of various community activities. In the context of ecosemiotics, *Kenduri Turun* can be seen as a form of ecological resilience—the ability of indigenous peoples to survive and maintain balance with nature through cultural rites.

Kenduri, as an annual event, shows that Acehnese people have an awareness of ecological rhythms. This ritual marks the transition between certain seasons or stages of life, ensuring that the activities that will begin are in harmony with nature. According to Hornborg, traditional communities often use rituals as a form of ecological coding, which is how they organise patterns of interaction with the environment through cultural symbols [34].

The data shows that women are busy preparing dishes and organising all the needs of the *kenduri*. This confirms that women have an important role in maintaining ecological values in the community. In addition, there is also a section that mentions that old women listen solemnly to Latif's messages. This indicates the transfer of ecological knowledge through stories and advice passed down from generation to generation.

In many traditions of local communities in the Nusantara, magical elements are often related to efforts to maintain the balance of nature. *Kenduri* in the data contains magical elements that function as a social mechanism to strengthen human relationships with the environment. The *Kenduri Turun* ritual creates a sacred space where people gather to start their activities with prayers and hopes. In cultural semiotics, such a space symbolises ecological sustainability in that humans are reminded to live in harmony with the environment. In addition, Acehnese people also use the context of Islamic values in the resilience process. Everything that happens in their lives is inseparable from God's intervention. This can be seen in the following data.

The flashes contained an average of twenty thousand amperes. That's equivalent to the energy a one-hundred-watt light bulb would require for more than three centuries. Brighter than ten million hundred-watt incandescents.

'He is the Lord who shows you lightning to cause fear and hope, and He makes clouds.' (QS 13:12)

Once again, Latif hid his fear. He walked slowly away from the door and sat down in the living room. Seti watched him from the kitchen (Abdaz, 2021, p. 181).

Acehnese people are known as a religious society with Islamic values that are very strong in daily life. In the context of nature conservation, this religiosity is not only manifested in normative teachings but also in belief practices that contain magical elements as a form of cultural resilience. The concept of magical resilience refers to Acehnese people developing ecological adaptation strategies through the spiritual interpretation of natural phenomena.

The text of Boy Abdaz's novel *Raifa dalam Dekapan Selembu* displays the close relationship between humans, nature, and spiritual beliefs in the Acehnese cultural context. The data shows that natural phenomena, such as lightning and clouds, are not only understood scientifically but also have spiritual and symbolic meanings. From a cultural ecosemiotic perspective, the elements in this text reflect the resilience of Acehnese

people in facing environmental challenges through religious and magical meanings of nature.

Resilience in the context of cultural ecosemiotics refers to a community maintaining ecological balance through cultural and spiritual meanings. The verse in QS Ar-Ra'd verse 12 confirms that lightning is understood as a sign of God's power that causes both fear and hope. This reflects the Acehnese people's awareness that natural phenomena are not just physical events, but also contain moral and spiritual messages. According to Putri et al., in the Islamic tradition, natural phenomena are often considered as *ayat kauniyah* (signs of God's greatness in the universe) [35]. This awareness reinforces the harmonious relationship between humans and the environment, which tend to maintain ecological balance as part of obedience to God's commands.

The magical element in this novel can be seen in Latif's character, hiding his fear of lightning. The existence of magical elements in folklore and local culture often serves as a mechanism for strengthening human relationships with nature. Lightning is often associated with supernatural powers or omens from the supernatural world. In Acehnese belief, lightning can be a sign of blessing or a warning of human behaviour towards the environment. This concept is similar to the beliefs of many tribes in Indonesia who regard lightning as a symbol of nature's anger towards ecological imbalance [36]. This belief shows that Acehnese people interpret natural phenomena not only scientifically but also within a spiritual and cultural framework. By interpreting lightning as a message from nature, people build a more intimate relationship with the environment, making it not just a living space but also an entity that must be respected. In the context of magical resilience, belief in natural signs such as lightning helps maintain ecological balance and strengthens local wisdom in the face of changing times.

In Sasak society, the novel *Sanggarguri* by Lalu Agus Fathurrahman narrates the meaning of land in the ecological landscape. Land in the lives of local people is not just a natural resource but also a symbol of spirituality, cultural identity, and ecological balance. In the novel *Sanggarguri* by Fathurrahman, land has a very important role in the life of the people of Biloq Hamlet in Lombok. This can be seen in the following data.

“This Biloq land is a heritage that must be preserved, because we do not own it. We borrowed it from *Yang Punya*, and it must be preserved until the end of time when *Yang Punya* takes it back. That's how we live this land with plants that fertilise it even though water depends on the sky. We plant not for us but for the land, and what is produced is what we eat as proof (*rizki*). In the same way, this land also supports us from between the stones that nail it. What we plant, it cares for, and conversely, what they ask for, we fulfil. That is how we and the land of Biloq Hamlet are.” (Fathurrahman, 2014, p. 106)

The data confirms that land is not only physically owned but also a trust that must be guarded. The data can be explored that the Sasak people have an ecological and spiritual view of land that connects humans, the environment, and religious values. In the Sasak society, land not only belongs to humans, but is part of a larger cycle of life. As part of spirituality, land is not considered a ma-ti object, but rather as part of their

religious beliefs and values. Land is not private property, but only borrowed from God so that humans are obliged to protect and preserve it. This philosophy shows that the Sasak people understand the ecological relationship between humans and the land. They not only exploit, but also care for and respect the land as a living entity.

The Sasak people in the data view the land as a source of life that must be managed wisely. The land is considered a giver of life. This makes the community not only take the results, but also try to maintain the balance. The land is an entity to be respected, which makes them not over-exploit the land, but plant with the aim of maintaining the fertility of the land itself. Soil fertility depends on human care, not just on the availability of water or geographical conditions. The people of Biloq Hamlet understand that the soil must be cared for to remain fertile, even though water depends on rain (water depends on the sky). The rocky and dry natural landscape of Lombok is not an obstacle for them, because they understand how to grow crops that suit natural conditions. Sasak farmers plant not for personal gain, but to keep the soil fertile, and the results are considered a blessing given by God. This reflects the concept of ecological sustainability between humans and nature are interdependent and must live in harmony.

In addition, land is considered by the Sasak people as a spiritual entity and culture. Land in Biloq Hamlet is understood not only as agricultural land, but also as part of the community's beliefs and culture. The relationship between land and humans is reciprocal in that the land supports humans, and humans must fulfil the 'requests' of the land, such as caring for plants or following customs in farming. This view shows the cultural ecosemiotics of the Sasak people reflected in their agricultural practices, in that the land is respected like a living being. Nature is not only seen as a resource, but also as part of the sign system in society.

3.2 Symbolic Landscapes and Resistance: Cultural Codes of Ecological Guardianship

Raifa dalam Dekapan Selembu also highlights the changes that have occurred in the forest at the foot of Mount Selembu. The once lush forest has now turned into eroded land. This shows the inevitable traces of exploitation. Meutia witnessed the devastation first-hand, with alarming soil stripping and wounds clearly visible from a distance. This is inseparable from the excessive exploitation carried out by various parties for profit without regard to ecological impacts. The domination of humans over nature that exists in Acehnese society is evident in the following quote.

Halfway through the journey, Meutia could already see Selembu's new face from afar. Several wounds on her face. The closer she got, the more she saw not just wounds, but violent peeling. Unfortunately, Meutia couldn't go deeper into Selembu, because at the end of the road, some guards blocked her. No other workers were allowed to enter for safety reasons. (Abdaz, 2021, p. 171)

The quote shows the transformation of Selembu's natural landscape, which has been damaged by human activities. The description of Selembu's 'new face', which has wounds and severe peeling, is a metaphor for the environmental destruction caused by

the exploitation of natural resources. The prohibition of entry for people other than workers on the grounds of safety confirms that such changes occur due to human interference in ecological exploitation such as mining, deforestation, or infrastructure development that damages native ecosystems.

Semiotically, the use of the word 'face' to denote Selembu's condition shows that nature is personified as an entity with life and identity. The description of Selembu's peeling face reflects the destructive nature of logging, soil erosion, or mining that causes the surface of the land to peel off. The wounds on Selembu's face can be interpreted as the physical impact of human exploitation, either directly through heavy machinery or indirectly through pollution or ecosystem changes. This reflects an imbalance between development and sustainability [37]. Humans prioritise economic gain over maintaining harmony with the environment.

The guards at Selembu symbolise the authority that protects the interests of industry and capitalism over the environment. Their presence signifies that nature has now been commodified and controlled by certain institutions, limiting access to it. This shows the gap between local communities and the economic actors who control natural resources. Exploitation can only be done by those with authority or capital.

Meutia, who wants to enter but is forbidden, reflects the people who care about nature but do not have the power to protect it. Her desire to see more of Selembu shows her ecological awareness and concern for the environment that has been destroyed. However, the ban on entry signifies that nature is now under the complete control of exploiters who have closed off access for the community to see the destruction.

In traditional cultures, people have a direct relationship with nature and utilise it sustainably. However, in the modern context, nature is monopolised by industry and government [38]. Access to it is restricted in favour of economic and security interests. This shows a shift in meaning in cultural ecosemiotics. Nature is no longer seen as part of human life, but as a commodity that can be exploited.

The wound on Selembu can be interpreted as a consequence of an eco-exploitation culture that prioritises development without considering sustainability. In an ecosemiotic context, this wound is not only a physical wound to nature, but also a wound to human awareness of the importance of maintaining ecological balance. This is in line with the cultural ecosemiotic theory that signs of natural damage also reflect changes in human cultural values in treating their environment [39]. The shift in meaning from nature as a sacred space and livelihood, to an object of exploitation that is closed to the community.

An ecological view based on spirituality is found in the local wisdom of the Acehese people. Nature not only has ecological functions, but also moral and religious values, so excessive exploitation is considered a violation of the balance of the universe. In addition, Acehese society is known as a society with a majority of followers of Islam and obedient to Islamic law. This influences the use of religious metaphors in defending nature. This can be seen in the following data.

What Rayyan did not understand at all were his brother's writings, which he had read. There were many words he did not understand, even though he read them over and over again.

Your grace inspires me.
Green and blue are my colors.
Sometimes I feel it waving at me, calling me.
I breathe in its charm deeply.
I see it dancing with the rain,
Clapping with the wind
Casting a cool shadow in the heat (Abdaz, 2021, p. 25).

The people of Aceh are known as a community that strongly adheres to Islam, with Islamic law applied in various aspects of life. Aceh is even nicknamed the Veranda of Mecca, reflecting the cultural and religious closeness of its people to Islamic values [40]. This high level of religiosity not only influences the social and legal systems but also how the people of Aceh treat and preserve nature. One form of local wisdom reflecting the connection between religiosity and environmental conservation is the recitation of prayers, poems, and symbolic narratives containing ecological messages.

In this context, the text from the novel *Raifa dalam Dekapan Selembu* by Abdaz presents a spiritual dimension in human interaction with nature. The poem written by Rayyan's older brother is not merely an aesthetic expression but also a reflection of ecological awareness rooted in spiritual values. The line "Your gift gives me life" shows that nature is not just a physical element, but also a manifestation of God's gift that is integrated with human life. This concept is in line with the Islamic view that teaches that humans have a responsibility to protect the earth as caliphs (QS. Al-Baqarah: 30). The awareness that nature is a divine gift fosters a sense of responsibility to preserve it, as Islamic values emphasize the importance of environmental balance and sustainability.

Furthermore, the phrase "Green and blue are my colors" shows that nature is not only the backdrop of life, but also part of human identity. In Islamic culture in Aceh, the environment is often associated with spirituality and purity. The tradition of the Acehese people to accompany various activities with prayers, such as prayers before planting crops or before going to sea, shows an awareness that interaction with nature must be based on gratitude and respect for the Creator. This belief is also reflected in various local poems that contain messages about the balance of nature and its sustainability.

Additionally, the line "I see it dancing with the rain, clapping with the wind, casting a cool shadow in the heat" shows that nature is personified as a living entity that interacts harmoniously with its environment. In Islam, this concept is known as *fitrah*, which refers to the natural balance created by God [41]. Acehese society, which highly values religiosity, often uses symbolism in poetry and oral narratives to emphasize the importance of maintaining this balance. By understanding nature as part of the divine system, humans are expected not to exploit the environment excessively but to care for it as part of their spiritual responsibility.

In the Sasak society of Lombok, ecological resistance is represented in the novel *Sanggarguri* by Lalu Agus Fathurrahman. The novel narrates how to understand the relationship with the land through rituals and customary rules. The Sasak people believe

that fields are not only owned by humans, but are also protected by supernatural forces that must be respected. Therefore, before clearing land, planting crops, and even before temporarily leaving it, a statement must be made to nature so that the guardian spirits are aware of humanity's good intentions. This belief not only protects the land from destruction but also ensures that humans live in harmony with nature. This is evident in the following data.

“This gate must be closed so that people know this field has an owner. The gate's leaves must be tied so that all creatures passing by know this field is entrusted to them, and we must say something so that nature can hear. The gate must be closed so that people can open it. That is the rule of life as a farmer, Kak...” (Fathurrahman, 2014, pp. 34–35).

In the novel *Sanggarguri* by Lalu Agus Fathurrahman, data on the importance of closing field gates as a form of respect for nature reflects that the Sasak people use mythology and rituals to maintain ecological balance. The statement that gates must be closed so that people can open them has a deep philosophical meaning. Closing gates is not merely a preventive measure, but also a symbol of the cycle of life.

Mythology in Sasak society serves not only as a belief system but also as an ecological adaptation strategy. By viewing the field as a trust that must be safeguarded, the community becomes more cautious in managing the land. The ritual of closing the field gate signifies a pause between one planting season and the next. Scientifically, land management with intervals aims to allow the soil to rest for a period of time, enabling it to recover naturally [42]. By believing that fields have guardian spirits, the Sasak people avoid overexploiting the land and its natural resources. Belief in the guardian spirits of the fields, the importance of communication with nature, and the cycle of life represented by the symbol of the door show that mythology can serve as an effective ecological mechanism [43]. Thus, understanding this local wisdom can provide insights into efforts for culture-based environmental conservation.

3.3 From Narrative to Pedagogy: Integrating Literary Indigenous Knowledge into Science Education

Literature, particularly narrative fiction rooted in indigenous contexts, offers rich cultural reservoirs for exploring ecological wisdom. In both *Raifa dalam Dekapan Selembu* and *Sanggarguri*, environmental narratives are not presented merely as thematic content but are semiotically encoded in the lives, rituals, and beliefs of Muslim communities in Aceh and Lombok. These narratives contain implicit ecological knowledge that can be interpreted and translated into culturally responsive pedagogical materials for science education [44].

Through a cultural ecosemiotic lens, these novels exhibit multiple layers of meaning related to environmental ethics, cosmology, and land stewardship. For instance, *Raifa* portrays the hills of Selembu not only as geographical terrain but as spiritual space

inhabited by barakah (blessing), stories of resistance, and Islamic cosmological meaning. Similarly, *Sanggarguri* presents land and water sources as sacred, connected to adat rituals and religious obligations. Such representations convey ecological insights that align with core scientific principles—such as balance, interdependence, and sustainability—yet are framed in local epistemologies [45].

When integrated into science education, these narratives can help students connect abstract scientific concepts—such as ecosystem dynamics or soil cycles—with real cultural realities. For example, the story of soil conservation in *Sanggarguri* parallels discussions about land use conservation, nutrients, and the ethics of fertilizer use. Similarly, forest protection in *Raifa dalam Dekapan Selembu* aligns with topics such as biodiversity, carbon storage, and climate regulation. By drawing connections between literary symbols and scientific content, educators can foster deeper and more contextual understanding [46].

Furthermore, these texts enable affective engagement with science through storytelling. Emotions, identity, and moral reflection are integral to how learners process and internalize scientific knowledge. The narrative arc of *Raifa*, for example, involves grief, spiritual calling, and communal action—experiences that resonate with students' emotional and moral selves. Embedding such stories in science lessons can enhance empathetic reasoning and ecological responsibility, which are often missing from conventional curricula [47], [48]. One of the challenges in science education, particularly in Muslim contexts, is the perceived disconnection between scientific rationality and religious-cultural values. By using texts like *Raifa dalam Dekapan Selembu* and *Sanggarguri*, educators can bridge this gap, showing that science can coexist with faith-based worldviews without compromising epistemic rigor. This approach aligns with the global push for culturally responsive STEM pedagogy, which recognizes students as cultural beings and seeks to validate their knowledge systems [49].

The use of indigenous narratives in pedagogy also supports decolonial approaches to science education. Western science is often taught as universal and value-neutral, marginalizing local ways of knowing. However, novels like *Sanggarguri* offer epistemological alternatives that challenge extractive paradigms and affirm sustainable, spiritually grounded relationships with nature. Teaching these stories in science classrooms can help re-center indigenous Muslim perspectives within the broader conversation on ecological justice [50]. Moreover, these narratives promote interdisciplinary learning by naturally linking science with literature, religion, ethics, and social studies. A lesson plan based on *Raifa* could involve ecological mapping, Quranic reflections on nature, and semiotic analysis of the forest as a living symbol. Such pedagogical designs not only enhance engagement but also foster holistic ecological literacy, grounded in students' sociocultural backgrounds [51].

Teacher agency is crucial in this integration process. Educators must be equipped to interpret literary texts ecologically and culturally, and to translate narrative elements into teachable science concepts. Professional development programs that train teachers in cultural ecosemiotics and local Islamic ecological wisdom can ensure more meaningful implementation of such approaches in schools, especially in pesantren or madrasah contexts [52], [53].

While this study focuses on two Indonesian novels, the framework can be adapted to other Muslim-majority regions with rich literary traditions. This opens up possibilities for a global Islamic science pedagogy that is both culturally grounded and ecologically committed [54]. In sum, literary narratives like *Raifa dalam Dekapan Selembu* and *Sanggarguri* offer more than symbolic representations—they are pedagogical assets. They contain indigenous environmental knowledge shaped by Islamic values, offering opportunities to integrate affective, ethical, and epistemological dimensions into science education. As climate change and environmental degradation continue to affect Muslim communities worldwide, it is urgent to recognize literature not just as art, but as a medium of knowledge transmission and ecological education.

4 Conclusion

This study has explored how Islamic indigenous knowledge related to environmental stewardship is embedded in literary narratives from two Muslim communities in Indonesia—Acehese and Sasak—through the novels *Raifa dalam Dekapan Selembu* and *Sanggarguri*. Utilizing a cultural ecosemiotic framework, the analysis reveals that land is not merely a physical space but a sacred trust (*amanah*) symbolically constructed through religious values, oral traditions, and cultural rituals. These narratives encode ecological ethics through symbols, signs, and storylines that reflect both Islamic theology and local epistemologies.

This is in line with research conducted by Efendi et al., which found that traditional conceptualizations of land rooted in spiritual, communal, and ecological ethics are increasingly being challenged by environmental exploitation [55]. The findings of this study align with and enrich a growing body of literature that highlights the role of indigenous and faith-based ecological knowledge in promoting environmental stewardship. Similarly, Özdemir [56] have argued that Islamic teachings inherently promote ecological responsibility through concepts like *mīzān* (balance) and *amanah*, which were reflected in the symbolic landscapes of the novels.

The findings demonstrate that such literary representations offer valuable insights for integrating culturally rooted environmental values into science education. They serve not only as artistic expressions but also as pedagogical texts that bridge scientific concepts with learners' cultural and religious worldviews. This integration supports the principles of culturally responsive STEM education, particularly within Muslim contexts, where the alignment of scientific knowledge with faith-based ethics is essential for meaningful learning.

Furthermore, the integration of literary indigenous knowledge into science education parallels the findings of Aikenhead [57], who promoted “cross-cultural science” by incorporating indigenous worldviews into science pedagogy. It reinforces the need for interdisciplinary pedagogies that connect narrative, culture, spirituality, and science. By centering local Islamic perspectives and ecological narratives, this study offers a model for decolonizing science curricula and promoting environmental literacy grounded in identity and place.

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