

## Phuyakha Phu Reai Wali: Efforts to Preserve Sentani Lake as a Source of Life Based on Eco-Theological Studies

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### Abstract

*Lake Sentani, one of the largest lakes in Papua, plays a vital role as a provider of life for the local community but is threatened by human activities. The eco-theology approach emphasizes the moral relationship between humans and nature as a divine mandate. The research method is qualitative and descriptive, with data collected through in-depth interviews with local stakeholders, authorities, and religious figures. Secondary data from previous research and relevant scientific publications are also used. The research findings indicate that maintaining the balance between humans, the lake, and its ecosystem is crucial for the sustainability of Lake Sentani. The local community holds a decisive view of the lake, considering it as "phuyakha phu reai wali" or the lake is my life. This perspective reflects a deep moral connection with the natural environment and their moral responsibility to care for it. Conservation efforts include biodiversity studies, increasing public awareness, and sustainable management. In conclusion, preserving Lake Sentani is not only an ecological issue but also has a strong spiritual dimension. The eco-theological approach highlights the moral responsibility of humans to care for nature as a divine trust. To maintain ecological balance and the well-being of the local community, conservation efforts involving local communities and relevant stakeholders are essential to ensure the lake's sustainability as a source of life.*

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## 1. INTRODUCTION

Lake Sentani, which covers approximately 9,360 hectares, is one of the largest lakes in Papua and is essential in providing livelihoods for local communities. However, increasing human activities around the lake, such as infrastructure development and population growth, seriously threaten its sustainability. Therefore, measures need to be taken to maintain the sustainability of Sentani Lake as a sustainable source of livelihood (Walukow, 2011). One strategy that can be used to preserve Lake Sentani is applying eco-theology. This approach integrates ecological science and theology to understand better the interconnectedness between humans and the natural world (Borrong, 2019). To preserve Lake Sentani, an eco-theological approach can provide an understanding to the community of the significance of preserving the lake as a life-giving gift from God.

From an eco-theological perspective, humans have a moral responsibility to maintain the survival of the natural environment, so the community around Lake Sentani needs to take concrete actions to protect it. Within the framework of eco-theology, human survival, and nature have a close and inseparable relationship, so protecting Lake Sentani as a source of life is a top priority for the surrounding community. By adopting sustainable conservation efforts, the survival of humans and natural ecosystems can be maintained for future generations.

Human activities, including agriculture, mining, and urbanization, have contributed significantly to increased erosion, sediment accumulation, and water pollution in the lake area, as evidenced by numerous research studies. Poor agricultural practices, intensive mining, and land-use change have led to severe soil degradation, increased erosion rates, and nutrient export to water bodies (Lizaga et al., 2023). Uncontrolled exploitation of forests is also one of the factors damaging the surrounding environment. All of this threatens the ecosystems and biodiversity in the lake and reduces the quality of water that is important for the lives of residents (Nurlaela, S., & Munandar, 2015). Moreover, population growth and increased human activities around Lake Sentani have increased pressure on the lake's natural resources. Overfishing practices, destructive fishing gear, and unsustainable fishing policies have led to a decline in the lake's fish population. The impact harms the livelihoods and quality of life of fishing communities that rely heavily on fish catches (Halim, Y., Nugroho, A., & Prajitno, 2019).

The results of the research on water quality analysis indicated that 1) several water locations showed levels of ammonia, nitrite, and dissolved oxygen (DO) that exceeded the water quality standards included in groups B and C, 2) the number of *E. Coli* within 0 - 10 meters in Zone II (Sentani main/central) exceeded the water quality threshold for public use, 3) Lake Sentani water pollution was mainly contributed by surrounding settlements and farms. Other pollutants include hotels, restaurants, vehicle washing facilities, water transportation, and others, and 4) based on physical parameters, the water quality of Lake Sentani still meets the requirements of water quality standards as stipulated in Government Regulation No. 20 of 2014 (class B and C) (Surbakti, 2020).

Other research indicates that Lake Sentani is classified as a eutrophic lake. This eutrophic state has decreased water quality, especially in supporting fauna such as mollusks and fish. Signs of eutrophic conditions can be seen in the low oxygen levels at depth and in some areas of the surface waters. This condition may negatively affect the mollusk population in Lake Sentani. In this study, the researchers investigated the mollusk groups utilized by the community around Lake Sentani, and they identified 5 species utilized by the community, namely *Thiara* sp., *Pomacea canaliculata*, *Pilsbryoconcha exilis*, *Bellamya* sp., *Faunus* sp. Some of these mollusk groups are widely distributed along the shores of Lake Sentani, including *Pomacea canaliculata*, *Pilsbryoconcha exilis*, and *Bellamya* sp (Surbakti, 2020). Another challenge in managing Lake Sentani is the lack of coordination among the various parties involved in lake management. Various stakeholders, including the local government, local communities, and the private sector, play an essential role in this effort. However, the lack of cooperation and coordination among them has hampered the ability to carry out effective management. In addition, limited capacity and resources have also been obstacles to carrying out efficient lake management activities (Tebay, 2019).

In addition to the issues above, several other issues and challenges are also the focus of Lake Sentani management efforts. One significant issue is the impact of climate change on Lake Sentani. Climate change, including rising temperatures, changes in rainfall patterns, and increased frequency of natural disasters such as floods and landslides, seriously impacts the lake's ecosystem. These changes can disrupt the ecological balance and threaten the survival of life around the lake. Therefore, climate change adaptation and mitigation strategies integrated into lake management are urgently needed (Indrayani et al., 2015). Population growth and demand for agricultural and residential land have also increased land conversion around the lake. Uncontrolled and unsustainable land use threatens ecosystems and biodiversity, resulting in habitat loss for endemic flora and fauna. Policies that focus on sustainable land use and ecosystem protection are needed (Widyastomo, 2011).

From a social and economic perspective, managing Lake Sentani is challenging. Social inequality, poverty levels, and limited access to essential services such as clean water and sanitation are issues that need to be resolved. A sustainable lake management approach should prioritize social equity and empower local communities to maintain the lake's sustainability actively. To address the problems and challenges that exist in the management of Lake Sentani, an eco-theological approach is needed that aims to change the traditional concept of man's relationship with nature. Although humans are given the power and responsibility to manage nature, there is often over-exploitation of natural resources without considering their impact (Stanislaus & Cap, 2019).

Eco-theology promotes understanding the need to protect the environment as an integral part of religious practice. This includes addressing environmental issues in religious ceremonies, advocating for social and environmental justice, and supporting environmentally friendly lifestyles (Vogt, 2023). Some fundamental principles of eco-theology include: First, regard creation as a gift: The universe and all creatures within it are regarded as gifts from God that must be respected and preserved. Second, maintaining balance and justice: Eco-theology emphasizes the importance of maintaining ecological harmony and promoting justice in the relationship between humans, nature, and fellow humans. Third, ecological solidarity: Eco-theology teaches that all life forms are interconnected and interdependent, and we have a responsibility to maintain the safety and well-being of the entire ecosystem (Borrong, 2019).

The earth and its contents play an essential role in the biblical narrative. In the Bible, the earth is depicted as the stage on which God communicates with humanity through the covenant of God (Jones, 2023). Allah created the heavens and the earth with great care and splendor, and six times, God appreciates the beauty and goodness of this creation, including the earth and the heavens (Diana Kebaneilwe, 2015; Dube, 2015). Therefore, in our relationship with God, the earth is considered a valuable part of His creation (Gen 1:1-2:25) that He carefully dresses and cares for (Ps 104). The Bible clearly states that God's love for the earth is profound, and God does not want the earth to be destroyed but is willing to take action to save it (Jn 3:16-17). Therefore, it is hoped that a better understanding of the issues and challenges of conserving Lake Sentani based on an eco-theological approach will encourage collaborative efforts from all parties to maintain the sustainability of Lake Sentani. Given the importance of preserving Lake Sentani as a source of life, the topics discussed in this paper are exciting and worthy of investigation.

## 2. METHOD

The research method that can be used to conduct this research is qualitative. Creswell emphasizes that the core point of qualitative research methods is a technique to describe, explore, and understand the meanings that individuals or groups consider important regarding social or humanitarian issues (Creswell, 2016). Primary data will be collected through in-depth interviews with relevant stakeholders such as local communities, stakeholders, and religious leaders. These interviews aim to understand their perceptions of environmental issues and the preservation of Lake Sentani, as well as their moral responsibility in maintaining the sustainability of the natural environment. In addition, secondary data will be collected from various sources, such as previous research reports and scientific publications related to the management and conservation of Lake Sentani.

After the data was collected, it was analyzed using the descriptive-analytic method to identify the emerging main themes. In this case, conclusions are drawn based on a standard or criteria that researchers have made from data related to *phuyakha phu reai wali*, efforts to preserve Lake Sentani as a source of life-based on eco-theological studies so that researchers can describe existing findings to make conclusions. The analysis results are in the form of narrative descriptions of the situation under study. The description of systematic and comprehensive exposure as a unit in the context of its environment is also systematic in its use so that the sequence of exposure is logical and easy to follow its meaning (Sudjana, Nana, 2004).

## 3. RESULTS AND DISCUSSION

### *Harmony of Life: Eco-Theology and the Interconnectedness of Humans, Lake Sentani, and its Ecosystems*

The health of ecosystems and the sustainability of the creatures that inhabit them depend highly on how humans treat the environment. God shows His impartial love towards His creation. God cares for humans' survival and other living things on Earth, as seen in the story of the Flood in Noah's time. God saved humans from the flood and commanded various animals to enter the ark to survive during the flood. It is affirmed that after the flood, God made a covenant with humans and animals (Gen 9:9-13), and the rainbow is a sign of that covenant that remains in effect today (Tinenti, 2015).

The Bible describes the relationship between nature or the earth and human beings as interconnected, not as standalone systems. The health and sustainability of the earth is a gift from God and is also dependent on humanity's relationship with the earth. Humans and nature support each other. The Garden of Eden, for example, requires a human role in its maintenance and management to keep it beautiful and functioning well, while humans depend on the garden as a source of food and shelter.

Eco-theology proposes that religious teachings provide ethical and moral guidance on how we should behave towards nature, focusing on creating balance and harmony between humans, nature, and God. This approach also involves reinterpreting sacred texts in the context of the natural environment. In the view of eco-theology, humans are regarded as stewards and guardians of nature, not as owners with the right to exploit natural resources for personal gain. Eco-theology encourages concrete actions such as sustainability practices, carbon emission reduction, biodiversity protection, and environmental policy advocacy. Lake Sentani is a concrete example in this

context, where the importance of maintaining and caring for the natural environment is evident. Lake Sentani is a source of life for local communities, including water, fisheries livelihoods, agriculture, transportation, and aspects of culture and tourism. However, siltation, pollution, and water use conflicts threaten the lake's sustainability.

Research results related to the concept of harmony of life in eco-theology and the interconnectedness of humans, Lake Sentani, and its ecosystem emphasize the balance and harmony between humans, nature, and God in a concrete context such as Lake Sentani where local people make Lake Sentani a source of life and hope for each generation. They often say in the local language, "*phuyakha phu reai wali*," meaning that the lake is my life. This is a very expressive way of showing how meaningful and close the relationship between Lake Sentani and the local community is, where the community's various needs and the surrounding ecosystem are intertwined. Lake Sentani is not only a water source but also a source of life for the local community. The concept also highlights local communities' moral and ethical responsibility to safeguard the lake and balance its ecosystem. The preservation of the lake is vital to their survival and well-being.

Almost all of their primary livelihood needs are sourced from the lake, which produces a variety of native fish, marine fish adapted to freshwater, introduced fish that live in Sentani Lake, and mollusk groups utilized by the community around Sentani Lake, such as *Thiara* sp., *Pomacea canaliculata*, *Pilsbryconcha exilis*, *Bellamya* sp., and *Faunus* sp. In Sentani Lake, Carp (*P. canaliculata*) and black needle snails (*Thiara* sp.) are abundant. In addition, Lake Sentani has the potential to meet domestic and industrial water needs, as well as agricultural irrigation, hydropower generation, fisheries development, ecotourism, and water transportation facilities.

Lake Sentani also has potential as an ecotourism destination that can be developed. In 2008, the Lake Sentani Festival was used to promote Lake Sentani tourism to the Papua Regional Government. This shows that Lake Sentani has the potential to become a tourist attraction that can provide economic benefits to local communities. On the other hand, local communities rely heavily on lake water as the primary source of clean water supply. Lake Sentani has become one of the most important sources of fresh water for the local population, and it is used for daily purposes such as consumption, cooking, bathing, and even agricultural irrigation.

Residents have also realized that Lake Sentani faces some problems, such as siltation, pollution, eutrophication, the introduction of alien species, resource exploitation, declining lake levels, and conflicts over the use of water resources. All of these issues have negatively impacted community incomes. The increase in population and human activities around Lake Sentani has put additional pressure on the lake's natural resources. Overfishing, using destructive gear, and unsustainable fishing practices have resulted in declining fish populations within the lake. The impact harms the livelihoods and well-being of fishing communities that depend on fish catches.

The importance of maintaining the sustainability of this source of life, therefore, requires Lake Sentani conservation measures that include research on the diversity of mollusk groups utilized, increasing public awareness of the importance of protecting the environment, planning residential settlements around lake waters, observing and surveying residents and traditional markets around Lake Sentani, evaluating water quality, and reducing water pollution. By making these efforts, it is hoped that the source of life in Lake Sentani can be maintained and sustainable (Surbakti, 2020).

Local communities have a moral responsibility to protect Lake Sentani as a mandate from God, not just as an exploitable resource. This shift in their view of Lake Sentani and their role as 'stewards of nature' is crucial in maintaining environmental sustainability and creating prosperity for local communities. In the ecological context, there is the exploitation of natural resources and the environmental challenges the Lake Sentani ecosystem faces. Meanwhile, the theological context refers to the importance of maintaining and caring for natural creations as humans' moral duty to maintain a sustainable source of life.

The natural health of Lake Sentani and the creatures within it is highly dependent on the way local communities treat nature. This refers to the view that humans have an essential role in preserving nature and ecosystems. Human actions, both positive and negative, significantly impact the balance of ecosystems and the well-being of other creatures. Lake Sentani is seen as a natural resource that can be exploited for human benefit and as part of God's creation that must be guarded and preserved. In the Christian view, nature or the earth is not considered an autonomous entity but rather as relational. The health and safety of nature depend on its relationship with humans, and conversely, humans also need nature. This reflects the understanding that humans and nature are interrelated and must live in harmony.

The local wisdom of indigenous Papuans, particularly the Sentani community, "*phuyakha phu reai wali*" reflects values related to sustainable environmental management, including moral unity with nature. The Sentani people, who live in harmony with nature (the lake) and consider nature as a source of livelihood and the work of God, thus always maintain a close moral relationship with their natural environment. This is a clear example of how the values of moral unity are realized in their daily lives by interacting with and caring for their natural surroundings (Hijjang et al., 2018).

This fact aligns with the eco-theology concept, which emphasizes the importance of maintaining a balance between human needs and ecosystem sustainability. In the context of Lake Sentani, human activities such as infrastructure development and agriculture should not be done in a way that damages the lake's ecosystem. In addition, eco-theology emphasizes the importance of solidarity between all living things. This means that the local community of Lake Sentani is responsible for preserving the lake and ensuring that all living things in the ecosystem can live in harmony. Maintaining harmony between humans, the lake, and its ecosystem is crucial to the sustainability of Lake Sentani. This includes maintaining biodiversity, raising community awareness, and sustainable management to ensure that this source of life benefits local communities. Thus, harmony of life: eco-theology and the interconnectedness of humans, Lake Sentani and its ecosystem is a holistic view or approach to environmental conservation that combines scientific (ecology), moral (theology) and socio-cultural aspects of the local community.

### ***Spiritual Harmony in Lake Sentani Preservation: Using an Eco-Theological Approach***

In Christian ecology, there are two significant aspects: God's ownership and providing services to humanity (Geisler, 2010). Therefore, in Christianity, ecological issues refer to the obligations and responsibilities of humans in caring for the earth as a mandate from God and to human cooperation with nature to reflect the glory of God (Remikatu, 2020). It also encompasses the idea that humans should work together

with nature to preserve and sustain God's creation. In this framework, man's duty is limited to God's worship and devotion in the spiritual realm and involves the management and preservation of the physical earth.

Humans are considered "stewards of the earth" who must maintain ecological balance, preserve biodiversity and prevent environmental damage. These actions are seen as a way to express God's glory, as God created the universe and gave humans the responsibility to care for it. In other words, ecological issues in Christianity emphasize that environmental conservation is not just a secular or social issue but is also part of humanity's spiritual calling to care for God's creation and honor His glory through good deeds in protecting the natural environment.

Environmental preservation, particularly of Lake Sentani, is not only an ecological issue but also has a spiritual or religious dimension. They combine religious values with environmental conservation practices to maintain ecosystem balance and ensure the sustainability of human life and the natural environment. The eco-theological approach emphasizes that humans have a moral responsibility to care for nature as a mandate from God, and conservation efforts should be based on these ethical and moral principles. In the context of Lake Sentani, this is particularly relevant given the environmental issues and the importance of preserving the lake as a source of life for local communities.

The research findings illustrate that spiritual harmony in the conservation of Lake Sentani using an eco-theological approach can include various efforts and practices that integrate spiritual values or eco-theological principles in preserving Lake Sentani. Local communities and NGOs work together to educate the public on the importance of using water wisely and responsibly. This includes clean water management for daily needs and agriculture.

Communities can be empowered to implement sustainable agricultural practices that minimize negative environmental impacts, such as excessive chemical pesticides and fertilizers use. This includes the promotion of organic farming and other environmentally friendly practices. Schools and churches can also be essential in educating communities, especially the younger generation, on protecting the environment and the spiritual values associated with nature conservation.

However, another concerning finding in recent years has been the emergence of behaviors or practices that damage the natural environment of Lake Sentani and contradict ethical and spiritual values, such as the dumping of household waste in liquid and solid form from the kitchen, bathroom and laundry into the lake, damaging the lake ecosystem and threatening the sustainability of natural resources. Unsustainable logging and uncontrolled land conversion into settlements or agricultural land can result in soil erosion, decreased water quality, and loss of natural habitats. Decreased coordination between local communities and local government may hinder practical conservation efforts. Some actions go against eco-theological values that emphasize maintaining harmony between humans, nature and God. To achieve spiritual harmony in the conservation of Lake Sentani, communities and stakeholders need to avoid these actions and adopt more sustainable and environmentally friendly practices.

In the Sentani context, nature is not only considered an object or target that can be exploited at any time but also like humans (mothers) who are seen as subjects or individuals who already exist. Singgih underscores the importance of achieving balance in considering God's immanence in His creation, making divine panentheism

particularly relevant. This is due to the focus on the relationship between humans and the Creator, which affirms that humans are the brothers and sisters of the rest of creation (Singgih, 1997). In Christianity, the concept of creation can be found in the book of Genesis, especially in chapter 12, which discusses creation and the relationship between God, humans, and the rest of creation.

Local communities should interpret that as human beings; they are called to be wise stewards of the natural resources that God has given them. This principle is reflected in various stories, such as the command to fill and rule over the earth (as recorded in Genesis 1:28) and the parable of property stewardship in Matthew 25:14-30. The Bible offers hope of restoration and refreshment for all of creation. For example, in the Book of Revelation, the image of the new Kingdom of God depicts nature restored and returned to its perfect condition (see Revelation 21:1-5). This calls us to actively contribute to safeguarding the environment and working towards ecological justice, believing that God will eventually restore all things to a state of good.

#### 4. CONCLUSION

The harmony of life on Lake Sentani involves the close interconnectedness of humans, nature and God, with an eco-theological outlook that underscores the moral responsibility of humans as stewards of nature, not owners with the right to exploit natural resources. Maintaining this balance and harmony encompasses ethical and moral principles and combines spiritual values with environmental conservation practices. Lake Sentani is a natural resource and part of God's creation, which must be respected and preserved. Conservation efforts involve community education, promoting sustainable practices, and solidarity between all living things. Challenges such as waste disposal and unsustainable logging must be addressed. The importance of maintaining harmony between man, nature, and God is the focus in maintaining the sustainability of Lake Sentani, with the hope of bringing benefits to the local community and its ecosystem. The local community concept of "*phuyakha phu reai wali*" reflects the Sentani people's close relationship with Lake Sentani, reinforcing their spiritual values in protecting the environment and affirming their moral responsibility as stewards of nature as mandated by God. By maintaining this spiritual harmony, local communities and stakeholders can contribute to the sustainability of Lake Sentani, create ecological justice, and honor spiritual values and awareness of the importance of maintaining harmony in life with humans, nature, and God.

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