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The Role of Customary Law in Overcoming Environmental Damage in the Lake Toba Geopark

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ABSTRACT

This study aims to discuss in depth the forms and factors causing environmental damage to Lake Toba Geopark, as well as to analyze the existence of customary law in efforts to protect the Lake Toba Geopark ecosystem based on PENA theory. The research method used is normative law research is the study of written law and other social norms. In accordance with applicable law, this descriptive-analytical approach aims to present factual, precise, and organized information on a particular subject. PENA's dimensions preventive (cultural strengthening), ethical (Batak values), narrative (community voices), and institutional (transparent governance) underscore that ecological restoration requires rebalancing knowledge power dynamics. Higher education must foster equitable dialogue between modern science and indigenous knowledge for a sustainable Lake Toba. This research emphasizes that ecological restoration cannot be achieved without restoring power relations in knowledge. Higher education must foster equitable dialogue between modern science and indigenous knowledge for a sustainable Lake Toba.

Keywords: Customary Law, Geopark, Higher Education, Sustainable Development, Pena Theory.

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INTRODUCTION

Lake Toba has the charm of a very beautiful landscape, abundant biological resource potential, and rich cultural heritage. The natural beauty of Lake Toba has been recognized by the world, and UNESCO officially designated the largest lake in Indonesia as a Global Geopark on July 7, 2020, at the 209th Session of the Executive Council in Paris. This decision confirms the Toba Geopark as one of the world's heritage sites (Sihombing, 2024). Data from the Ministry of Tourism of the Republic of Indonesia states that in 2024, foreign tourist visits to Lake Toba will reach 420 people and 7.8 million domestic tourist trips.

The lake, which was formed from an ancient super volcano tens of thousands of years ago, is also an important ecosystem for nature and the people of North Sumatra. Lake Toba water is a source of agricultural irrigation and hydroelectric power plant (PLTA) energy in several districts (Silaban, 2021). In addition, the forest area of the National Strategic Area (KSN) of Lake Toba is estimated to be around 115,484.04 hectares, consisting of protected forests, production forests, water catchment areas, and river flow areas (Sitindaon, 2020). Lake Toba has historical and cultural values that are very important for the community, especially the Batak Tribe, related to the geological origins, cultural values, social systems, and cultural identities that still exist today. The beauty of the landscape and the diversity of culture are the main attractions for tourists to visit (Sujaini, 2020).

The increase in human activities, especially industrial, agricultural, and tourism activities, clearly threatens the sustainability of the Lake Toba ecosystem. The Lake Toba Lovers Foundation (YPDT) noted that from 2005 to 2025, at least 6,503 hectares of natural forests in the Lake Toba area have been lost, especially around Parapat and the Simalungun area (Aek Nauli sector). The area of natural forests has shrunk drastically (Sidauruk et al., 2025). The area of critical and very critical land in the Lake Toba catchment area reaches around 28,911 hectares or 10.98 percent of the total area of the DTA, which exacerbates the risk of floods and landslides in the area (Veronica, 2023).

In addition to the destruction of forest ecosystems, Lake Toba also faces the problem of water quality pollution caused by floating cage waste from large corporations. The complexity of the environmental pollution problem has clearly threatened the sustainability of the Lake Toba ecosystem (Hutajulu et al., 2023). The current normative legal instruments have not been able to provide comprehensive protection for Lake Toba from pollution. In 2023, UNESCO warned the Indonesian government to fix these problems, or the status of the Lake Toba Geopark will be revoked (Sinulingga et al., 2024).

In the midst of this real threat, the Batak indigenous people continue to strive to protect the Lake Toba ecosystem through local wisdom (customary law). The Batak indigenous people still uphold customary norms in protecting the environment from damage. Unfortunately, customary law instruments do not apply to large-scale environmental polluters (corporations), so they seem less effective (Irianto, 2013).

As a solution to this problem, the holistic legal framework and PENA Theory (Preventive, Ethical, Narrative, Accountable) proposes customary court institutions as dispute resolution, customary sanctions, and strengthening norms of nature protection. Although it has not been formally recognized institutionally, traditional values are still alive in social practice. So that customary judgments or sanctions given for environmental pollution have executory power and can have a deterrent effect on the perpetrators. Customary courts have great potential to be empowered for the prevention, education, and resolution of community-based environmental conflicts (Imamulhadi, 2019). Therefore, a regional policy is needed that re-institutionalizes customary courts as partners in the preservation of geopark areas in a participatory and contextual manner.

RESEARCH METHODS

The method used in this study is normative law, which is the study of written law and other social norms. In accordance with applicable legal provisions, this descriptive-analytical approach aims to present factual, accurate, and organized information on a particular topic. Legal regulations and customary rules are analyzed using the PENA Theory approach to produce sustainable solutions. Data collection was carried out through literature research, which required gathering information by searching secondary sources or libraries, such as primary legal materials, secondary legal sources such as books, regulations, and other scientific journals, or university legal sources such as dictionaries, magazines, newspapers, and articles. (Triono Eddy, Agustina, 2025).

RESULTS AND DISCUSSION

Forms and Factors Causing Environmental Damage to Lake Toba Geopark

Lake Toba was formed geologically due to the super-volcanic eruption of Mount Toba, which was very powerful about 74,000 years ago with the strength of the Vulcanic Explosivity Index (VEI) 8. The large caldera resulting from the eruption was then filled with water to form Lake Toba, which has a length of about 100 km, a width of 30 km, and a total area of 1,265 square km, making it the largest lake in Indonesia (Nur et al., 2024). Administratively, the Lake Toba area is located in North Sumatra Province, which includes seven districts, namely: Toba, Samosir, Simalungun, Karo, Dairi, Humbang Hasundutan, and North Tapanuli Regency (SyahriaL, 2020).

The natural beauty of Lake Toba stands out with its clear blue water and the surrounding mountain views. In the middle of the lake, there is Samosir Island, which is a large volcanic island, providing a unique natural tourist attraction. The vast landscape of the caldera and the incredible depth of the lake add to the beauty and uniqueness of its ecosystem. However, behind the charm of nature, poor environmental management results in massive levels of pollution and damage to forest areas (Sunaryani, 2018). Regarding this problem, UNESCO gives a serious warning to the Government of Indonesia to immediately address this problem, or the status of the Toba Caldera Geopark will be revoked.

Industrial activities are the main factors causing environmental pollution (especially water pollution and deforestation) in the Lake Toba area. Overall, waste from fishery and industrial activities causes a decline in water quality, both in the form of organic and chemical pollution, eutrophication, habitat damage, and ecosystem disturbances that negatively impact biodiversity and the welfare of the

surrounding community (Syamsu et al., 2025). The form of pollution and its causative factors are explained as follows:

1. Industrial activities cause water quality pollution due to floating clumped waste from fishery cultivation in Lake Toba. In addition, the presence of the factory also resulted in prolonged agrarian conflicts with the local community (Setiawati et al., 2024).
2. Tourism, clearing forest land for resorts, tourist destinations, and plantation forests in several locations, causes deforestation and damage to forest ecosystems, thus triggering erosion and flood disasters. Unfortunately, the rampant development of Lake Toba tourism has not had a significant positive impact on the welfare of the local community (Simanihuruk et al., 2023).
3. Community activities, the large number of people who carry out illegal logging and clearing land by burning, result in frequent forest fires in the Geopark area (Hidayani, 2021). In addition, the disposal of household waste and floating cage waste also contributes greatly to Lake Toba water pollution.

The following are the cases of environmental damage and pollution that occurred in the Danai Toba Geopark area:

Illegal logging occurred massively on about 469 hectares of Protected Forest land managed by the Dosroha Forest Farmers Group in the Samosir area, adding to the ecological damage to Lake Toba. In addition, forest fires also occurred again in July 2024, protected forests in the Siarubung area, Dolok Sijonaha, Sipitu Dai Village, Sianjur Mulamula District, Samosir Regency, burned around 300 hectares of forest. These fires damage geodiversity and biodiversity in the Toba Caldera UNESCO Global Geopark, including the Pusuk Buhit circumference and the walls of the Toba Caldera. These fires occur almost every year, and the response has not been maximized due to low public awareness, limited resources, and infrastructure (Utomo, 2022).

From 2022 to 2025, there are at least 167 hectares of burned land in five sub-districts in Simalungun Regency, namely Haranggaol Horisan, Purba, Pamatang Silimahuta, Dolok Pardamean, and Pamatang Sidamanik. On Saturday (21/6/2025), there was another land fire in Haranggaol Horizon, which burned 30 hectares of forest land. Based on data from the Forest Management Unit (KPH) Region II Pematangsiantar, forest and land fires in Simalungun are caused by community activities that clear land by burning bushes or vegetation illegally.

Flash flood on March 16, 2025, in Parapat, Simalungun Regency, North Sumatra, caused by the overflow of the Batu Gaga River. The main cause of this flash flood, in addition to high rainfall, is uncontrolled deforestation of conservation land, especially related to the activities of the company PT. TPL, which has caused a decrease in the area of the natural forest around Parapat, covering an area of 6,503 hectares in the last two decades, has been replaced by eucalyptus plantations (M PA Coetzee, 2011). Forest destruction and large-scale deforestation in watersheds included in the concession of PT. TPL also contributes to a decline in water quality and an increased risk of flash floods and landslides.

The results of the investigation by the North Sumatra Environment Agency stated that PT. AN violates the environment by not processing liquid waste before disposal and producing fish beyond the carrying capacity of Lake Toba. In addition, a report from the Lake Toba Lovers Foundation (YPDT) and the results of independent laboratory tests showed water pollution around the cages of PT. AN is very significant, with pollutant content far exceeding safe standards. This condition results in a decrease in lake water quality and a threat to the survival of the ecosystem and the surrounding community (Rizky Arimazona Siregar, 2018). PT AN manages hundreds of floating net cages in Lake Toba and produces organic waste and chemicals such as BOD (biological oxygen demand), COD (chemical oxygen demand), and phosphorus that exceed the water quality standard threshold, thereby worsening the lake's water quality (Manik, 2019).

The "New Bali" tourism project of Lake Toba by the central government triggered a land conflict with the Sigapiton Indigenous People. Indigenous peoples who live in descendants on customary lands are threatened with eviction. The Sigapiton Village women's group resisted the tourism development activities. Several local women's groups held a protest against land clearing on 12/9/2019. In the action, a group of women blockaded the police and excavators who were going to build a road from the Nomadic Caldera Toba Escape to Batusilali. The women protested by undressing and clashing with

security forces. The action had temporarily stopped the land clearing process, but the excavators resumed operations (Wilbert, 2021).

The Existence of Customary Law in Efforts to Protect the Sustainable Lake Toba Geopark Ecosystem Based on PENA Theory

Culturally, the Batak people have long known customary courts as a legal norm in resolving problems through a deliberation mechanism and the imposition of strict sanctions against violators of customary rules. In the era of King Siallagan on Samosir Island, the concept of Batak customary justice was established, as evidenced by the legacy of the Batu Kursi Site. Batak customary courts have an important role in maintaining social order and customary values, including in protecting the environment of Lake Toba from damage (Santoso et al., 2024).

Batak customary law has a special rule that functions as environmental and forest protection, namely the Surat Tumbaga Holing, as an unwritten Batak law that is binding and respected for generations. Literally, Surat means guide, Tumbaga means copper, and Holing means black or invisible. Thus, Surat Tumbaga Holing is understood as a guide to life that is not formally written but becomes a guideline for the behavior and customary rules of the Batak people in daily life. The Tumbaga Holing letter contains customary and legal values that govern various aspects of people's lives, including family relations, customary governance, customary ceremonies, cultural arts, customary languages, as well as customary civil and criminal law (Ryan Taufika, Aulia Rahma Ritonga, 2025).

From the cultural aspect, the Surat Tumbaga Holing cannot be erased (naso ra sasa), which is symbolically written in the hearts of the Batak people and inherited from generation to generation. Although unwritten and non-formal, this institution is still alive and applied in daily life as a moral and social guideline (Rochaeti et al., 2023). The following are some of the provisions of the Tumbaga Holing Letter that are related to the protection of the hudup environment, especially in Lake Toba:

1. The Batak indigenous people prohibit the indiscriminate cutting of trees, especially for sale. Logging is only allowed for the construction of traditional houses (sopo godang), bridges, or in the public interest.
2. Customary law requires the replacement of felled trees by planting two new trees. In addition, there is a prohibition on clearing fields or rice fields by cutting down forests around mountains and hills. It is aimed at preventing environmental damage and maintaining the balance of the ecosystem.
3. Rules to protect grazing pastures, brackish, and trees as a source of livelihood and part of the environment that must be maintained;
4. Customary sanctions are given to perpetrators of environmental destruction, including social fines and exclusion. This sanction is a form of indigenous peoples' commitment to protecting the environment (Harahap, 2021).

Overall, the existence of Batak customary law is alive and respected, especially by the people in Toba Samosir, as the main instrument in maintaining the Lake Toba Geopark ecosystem sustainably. Batak customary law integrates social, cultural, and spiritual aspects in environmental management, thus becoming an effective conservation model for the sustainability of the Lake Toba Geopark ecosystem (Nasution, 2024).

As a legality of the existence of Batak customary law, the Toba Samosir Regency Government has issued Regional Regulation (Perda) Number 1 of 2020 concerning the Customary Rights of the Toba Samosir Batak Customary Law Community. This Regional Regulation is a legal standing for the recognition, respect, protection, and fulfillment of the rights of the Batak Toba customary law community, especially related to customary areas (environment). Unfortunately, the implementation of this Regional Regulation is still not running effectively due to a number of challenges, especially related to political and business interests. However, relevant stakeholders continue to strive to find the best solution so that indigenous communities obtain legal certainty over customary territories and their rights (Pasaribu, 2022).

The PENA (Preventive, Ethical, Narrative, Accountable) theory is an approach to the development of the legal system as a tool for social transformation, paying attention to the depth of values,

humanity, and the balance between prevention and enforcement. This theory was born out of legal fragmentation that only prioritizes normative certainty but ignores contextual justice and utility. A holistic legal framework, PENA seeks to integrate philosophical, psychological, and sociological dimensions in legal thinking. Law is not seen solely as a normative text, but rather as a living system that must be on the side of ethical values, local wisdom, and sustainability (Tongat et al., 2020).

The substance of this theory is in progressive law, as developed by Satjipto Rahardjo, where law must not be frozen in ivory, but must change according to the demands of the times and social reality. The law must live with the people, understand the suffering, and provide solutions based on empathy and corrective action (Aulia, 2018). The concept of the Pen Theory in the existence of customary law for environmental protection, namely:

1. Preventive: strengthening customary law as a community-based ecosystem damage prevention system;
2. Ethical: restoring the rights and dignity of indigenous peoples as guardians of ancestral heritage lands;
3. Narrative: placing stories, history, and customary practices as a form of living legal legitimacy;
4. Accountable: emphasizes the importance of state and corporate transparency in respecting customary law and improving environmental impacts.

In the concept of environmental crime, PENA Theory supports the implementation of restorative justice, namely, that punishment is not just an orientation of retribution, but of the recovery of the victim, and the responsibility of the perpetrator. Justice is not measured by how severe the punishment is imposed, but by the extent to which the law can restore dignity and prevent crimes from happening again (Irvan Maulana, 2021). However, PENA also does not ignore legal certainty, but makes it the final result (goal) after the legal process in a fair, ethical, and participatory manner. Certainty is not a limiting starting point, but the fruit of a legal, honest, and accountable process (Goesniadhie, 2010).

The concept of PENA Theory emphasizes that customary courts function as a forum for dispute resolution, sanctions, and strengthening norms of nature protection. Although the Batak customary court is not a formally recognized institution, its wisdom is still alive in social practice. To provide legal certainty to the community and environmental protection, it is very important to establish a Customary Court body. So that customary judgments or sanctions given for environmental pollution have executory power and provide a deterrent effect to the perpetrators (Donni Briando Limbong, 2021).

For comparison, Mozambique (Africa) also has a Customary Law that regulates environmental protection, especially the right to land for indigenous peoples (Lei da Terra). The local wisdom of Mozambican indigenous communities also includes the prohibition of hunting or the use of certain species that are considered rare or of ecological and cultural importance (Gota et al., 2024).

In practice, indigenous peoples in Chitanga, Mozambique, implement coastal and marine management by granting exclusive rights to local fishing communities to regulate fishing activities sustainably, including the protection of important habitats as an effort to protect endangered species. This approach empowers local communities to maintain habitats and populations of vulnerable species, while regulating human activities so as not to damage ecosystems (Schafer et al., 2010).

Ecosystem protection Lake Toba Geopark, customary courts are not intended to deal with large-scale ecological crimes, but have the potential to be re-empowered as a community-based environmental conflict prevention, education, and resolution effort. Article 601 Paragraph (1) of Law Number 1 of 2023, recognizes and regulates customary law, states that every person who commits an act that, according to customary law, is prohibited can be subject to a criminal penalty, even though the act is not regulated in the national criminal law. Therefore, customary courts can be partners in the preservation of geopark areas that are just for the environment and the social community (Nur Rochaeti, 2018).

CONCLUSION

The form and factors that cause environmental damage to Lake Toba Geopark are caused by three factors, namely industrial activities, tourism, and the community. The forms and causes of pollution that occur are in the form of: water pollution due to household and industrial waste (floating cages) of

fish farming, conversion of protected forest areas into production forests, construction of factories, resorts, and agricultural land. This environmental damage triggers flood and erosion disasters, as well as ecosystem disturbances in forests and lakes that hurt the environmental and social sustainability of the community.

The Batak indigenous people have knowledge and values of local wisdom related to environmental conservation and sustainable land management, so customary law plays an important role in protecting Lake Toba from pollution. Surat Tumbaga Holings is clear evidence of the strong commitment of the Batak people, spiritually and materially, to nature as an ancestral heritage. Through the PENA Theory, it supports the implementation of restorative justice where punishment is not only oriented towards retribution, but also towards the recovery of the victim, and the responsibility of the perpetrator. For this reason, it is urgent to establish a Customary Court Institution as a form of legal certainty and environmental protection through living law.

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