

Potential of local wisdom as an effort to prevent damage to forest resources

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Abstract: Deforestation is a problem that often occurs in forest resources and has an impact on human life. This study aims to analyze the potential of local wisdom of indigenous peoples in efforts to prevent deforestation. Forest resources that have an important role in supporting the lives of living things are threatened by the very high rate of deforestation. Government efforts to reduce the rate of deforestation are still less than optimal, as evidenced by the very dynamic rate of deforestation. Therefore, efforts need to be made to reduce the rate of deforestation by involving indigenous peoples through their local wisdom. The method used in this study uses a qualitative research with a library research method to contain the research results. The results of the analysis show that deforestation is influenced by the ease of obtaining concession permits to utilize forest resources without management. Local wisdom of indigenous peoples has great potential in reducing the rate of deforestation based on perspectives, rules, and sustainable use of forest resources.

Keywords: forest; indigenous peoples; local wisdom; preventing deforestation

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Introduction

The existence of forest resources has an important function for the survival of life. As an ecological function, forests provide oxygen and store carbon dioxide, provide biodiversity, regulate the water cycle, and provide soil fertility (Purwatiningsih, 2022). Apart from that, the wealth of forest resources also has an economic function which comes from forest products in the form of wood, rubber, rattan, animals and others which have economic value for the community (Fahyumi & Muzani, 2022; Herutomo & Istiyanto, 2021). On that basis, management of forest resources must be balanced based on their main functions so that the sustainability of the forest ecosystem is maintained (Murti & Maya, 2021; Widodo & Sidik, 2018). Based on data Food and Agriculture Organization, (2020), the total forest area in the world in 2020 was 4.06 billion hectares, but this area has decreased over time. This can be proven by data on Indonesia's forest area in the 1990-2013 range, where from a total area of 105 million hectares to 97 million hectares in 2013 or only 51% of Indonesia's total land area (Djaenudin & Dwiprabowo, 2018). This shows the loss of forest land cover or massive deforestation in Indonesia. According to data Forest Watch Indonesia, (2019), in the 2013-2017 period, forest land cover lost in Indonesia reached around 1.47 million hectares every year.

Deforestation is the main cause of the decline in forest area in Indonesia. This factor was caused by massive exploitation in 1980-1990 where the forestry sector was the largest sector driving Indonesia's economic growth (Istiawati, 2016). Apart from that, forest destruction that continues to this day is caused by the government's laxity in granting permits for forest land concessions, resulting in forest management not running as it should (Arif, 2016). This condition is proven through the conversion of forests into

agricultural land, large-scale timber harvesting, forest fires, and the biggest impact is the impact of the development of oil palm plantations, areas and industrial forest plantations (Nahib & Yatin, 2017). This condition is contrary to Article 33 paragraph of the 1945 Constitution which states "that the earth and water and the natural resources contained therein are controlled by the state and used as much as possible for the prosperity of the people". But based on Nakita & Najicha, (2022), The facts that occur actually emphasize the aspect of state control over forest resources. So people tend to experience negative impacts from excessive use of forests without good management (Fahyumi & Muzani, 2022). Utilization that is more dominant than management has an impact on reducing the ecological function and economic function of forest resources, thereby triggering forest destruction which poses a threat to living creatures and global climate change (Dita Shafitri & Prasetyo, 2018; Herutomo & Istiyanto, 2021). These threats include global warming, loss of water sources, loss of biodiversity and erosion and floods (Rahman & Bakri, 2020). In the end, those most affected are indigenous peoples who depend on nature for their livelihoods (Nakita & Najicha, 2022). This is proven by the flood incident that occurred in the Kampung Naga community in 2021, where the cause of the flood was not caused by the actions of residents but rather a shipment from the Garut area (Holilur Rohman et al., 2022). Currently, the Indonesian government has made efforts to reduce the rate of deforestation and forest degradation. Data collected by the Ministry of Environment and Forestry (KLHK) shows a decrease in the deforestation rate of 8.4% in the 2021-2022 period compared to the previous year. However, the data still reflects ongoing deforestation in Indonesia, and therefore, the government requires additional support to advance sustainable management of forest resources. One strategy that can be implemented is involving the participation of indigenous communities. According to Sembiring et al.,(2020), optimizing forest management in line with providing access to local communities around forest areas is a necessity. The involvement of indigenous communities functions as a control and manager of deviations that occur in forest resource management (Jamaluddin et al., 2023). Apart from that, involving indigenous communities also provides opportunities for local communities to defend their living space because communities are the first to feel the impact of forest destruction (Najib et al., 2024). Local communities living in forest areas have rich knowledge and understanding of cultural traditions and practices related to the management of natural resources, especially forests. Their presence in the surrounding forest areas has established this tradition as an integral part of their lifestyle over the years. Environmental wisdom can be defined as a heritage of local knowledge that includes a deep understanding of beliefs, customs, values and norms relating to the relationship between humans, nature and interactions between ecological communities (Wiasti, 2016). Based on this problem analysis, this research aims to analyze the potential of local wisdom possessed by indigenous communities in Indonesia in efforts to manage sustainable forest resources, especially in preventing deforestation.

Method

This type of research is qualitative research with a library research method. A research method to identify, explore, and interpret all relevant research results related to a particular criminal question, a particular topic, or an interesting phenomenon (Jhon, 2021; Liu et al., 2023). The type of data used in this research is sourced from secondary data. The data collection used a method of searching for sources and constructing from various sources, for example books, journals and research that had been conducted (Adlini et al., 2022).

The method of collecting data by understanding and studying theories from various literatures related to the research (Adlini et al., 2022). There are six stages in this study, namely topic selection, information exploration, determining the focus of research, collecting data sources, preparing data presentation and compiling reports (Sari & Asmendri, 2020). Topic selection, information collection, determination of research focus, data source collection, data presentation preparation and report preparation. First, the author researches the topic of deforestation. Second, the author explores information related to deforestation and how communities overcome deforestation problems. Third, the author analyzes the focus of this research, namely studying the local wisdom of indigenous peoples in efforts to prevent deforestation. Fourth, the author collects data sources by analyzing books, official websites and previous research journals containing keywords including local wisdom, indigenous peoples and deforestation with the criteria for articles analyzed including articles published in the period 2015-2023, and articles used in the form of accredited journals. The literature obtained from various references is analyzed in depth in order to support propositions and ideas.

Results and Discussion

Rate of Deforestation of Forest Resources in Indonesia

The main problem of forest resource management in Indonesia is influenced by the continuously high rate of deforestation. The reduction in forest land area due to conversion of forest land for infrastructure

development, residential agriculture, plantations and mining is one form of deforestation (Nakita & Najicha, 2022). The overall distribution of Indonesia's deforestation rate is presented through data from the Ministry of Environment and Forestry which is shown in Table 1.

Table 1. Development of Indonesian Deforestation

Areas	Area (Million Hectares)					
	2018-2019		2019-2020		2020-2021	
	Gross Deforestation	Reforestation	Gross Deforestation	Reforestation	Gross Deforestation	Reforestation
Indonesia	0.47	0.003	0.12	0.0036	0.14	0.03
Forest	0.38	0.003	0.07	0.0003	0.10	0.02
Non-regional	0.09	0.0002	0.05	0.0008	0.04	0.00

(KLHK, 2022)

This data shows that in the 2019-2020 period the deforestation rate was the lowest with a percentage of 75.3%. This decrease was caused by the rate of reforestation being greater than the rate of gross deforestation. In the 2018-2019 period, deforestation in plantation forests was 275.8 thousand hectares, while in the 2019-2020 period deforestation in plantation forests was negative 1.2 thousand hectares. However, efforts to reduce the rate of deforestation in Indonesia have not been consistently demonstrated through data on the rate of deforestation which has increased again in 2020-2021.

The high rate of deforestation is influenced by forest resources as export commodities with high economic value, but at the expense of forests due to forest utilization practices without paying attention to management aspects (Djaenudin & Dwiprabowo, 2018). On the other hand, according to the KLHK, (2022), high deforestation is influenced by the El-Niño phenomenon which causes large fires in the East Kalimantan region. Indonesia's deforestation rate can be seen in depth based on deforestation data per province. Based on data KLHK, (2022), the net deforestation rate in the 2019-2020 time period is presented as follows.

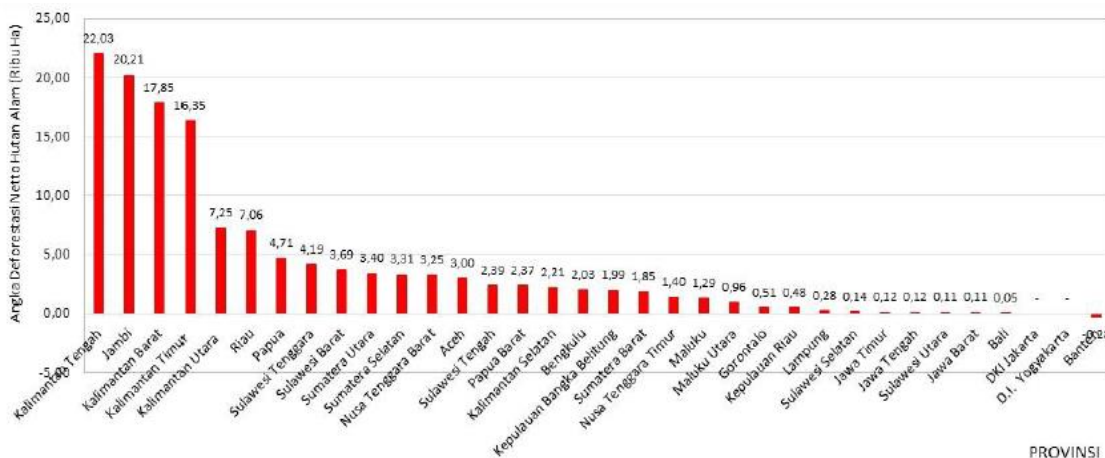


Figure 1. Net deforestation rate per Province (Thousand Ha) 2019-2020 (KLHK, 2022)

This data shows that the 5 provinces with the highest net deforestation rates are the provinces of Central Kalimantan, Jambi, East Kalimantan, and North Kalimantan, Riau. The large amount of deforestation in the islands of Kalimantan and Sumatra is triggered by economic factors where land clearing is used for mining, plantations and other economic activities. Based on data. In the Kalimantan archipelago, 47% of the forest area has been converted into oil palm plantations, while in the Sumatra archipelago, 57% of the forest area has been converted into oil palm plantations. The magnitude of land conversion in the Sumatra and Kalimantan regions is quite worrying and has the potential for great danger to environmental sustainability, considering that these areas are buffers for the world's oxygen supply. Based on research Forest Watch Indonesia, (2019), Indonesia's future deforestation conditions will shift to the eastern region, namely in the Sulawesi, Maluku and Papua regions. The trend is for its use as monoculture plantations and infrastructure projects (Nur Rohma, 2020). This can be seen based on the accumulated data on forest area releases as follows.

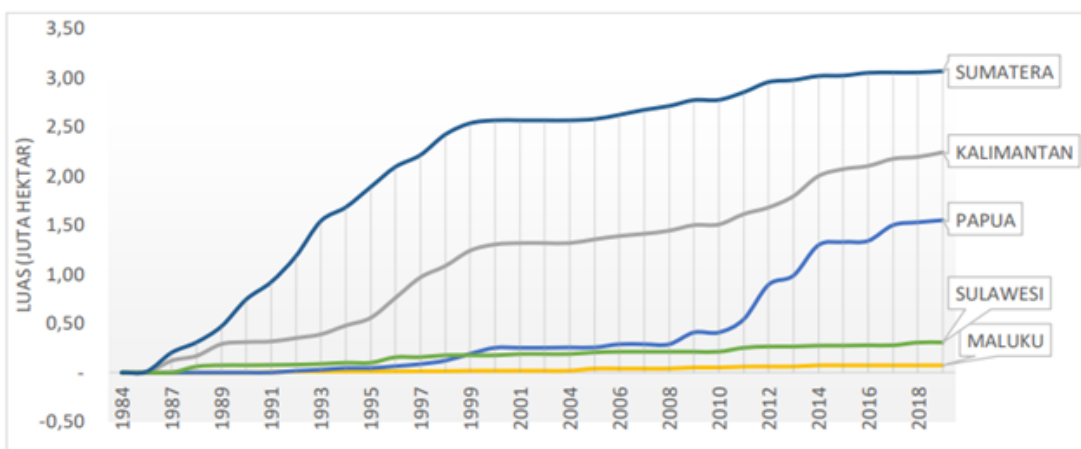


Figure 2. Allocation of Forest Land Release Per Province (Forest Watch Indonesia, 2019)

Referring to the data in Figure 2, the area of forest land release has shifted to eastern Indonesia, namely Sulawesi, Maluku and Papua. Based on the data, if we look at the size of the forest area used, these three regions do not show a drastic increase, but if we look at the percentage increase compared to other regions in Indonesia, it shows that there has been a consistent increase in the use of forest areas as production areas. This is also supported based on data Forest Watch Indonesia, (2020) where the Papua region in 2017 contributed to production forests amounting to 20% of the total production forests that were directed to be utilized.

The worrying condition of deforestation in Indonesia is closely related to patterns of use and utilization of forest land. According to Nakita & Najicha, (2022), Indonesia's deforestation rate is influenced by several factors, including; Large-scale clearing of forest areas is influenced by the imbalance between demand for wood and available resources. Forest logging activities are shown by a decrease in forest land area of 64 million hectares in a period of 50 years, People's bad habits in managing forest land include clearing land by burning the forest. The impact of this bad habit causes forest fires in large areas and causes emissions. Mining potential, which is often located in forest areas, is a factor that exacerbates forest destruction for mining access and location needs. This is addressed by data from the Department of Energy and Mineral Resources which shows that since 2001, 11.4 million hectares of protected forest area has been converted to mining.

However, based on analysis from Forest Watch Indonesia, (2019), this factor is due to the ease with which forest land concession permits are granted by the Indonesian government. This is proven by forest concession permit data up to 2017 of 71.2 million hectares. Where this data when compared with the total land area in Indonesia has a percentage of 37% of all land. There are four types of permits related to the utilization and use of forest land including: Business Permit for Utilization of Timber Forest Products in Natural Forests, Business Permit for Utilization of Timber Forest Products in Planted Forest, Business Permit for Palm Oil Plantations, and Mining Permit. Data on forest areas subject to utilization permits in 2017 can be seen in Table 2.

Table 2. Natural Forest Areas subject to Permits in 2017

Region	Overlapping, HPH, HTI, Palm Oil Plantations, Mining	HPH	HTI	Palm plantations	quarry	Total Natural Forest Areas that have been licensed (Ha)	Natural Forest Areas that are not subject to permits
Sumatera	163.384	546.033	494.305	74.039	999.248	2.277.009	8.123.005
Jawa*	-				10.003	10.003	895.881
Bali Nusa	3.365	7.085	2.789	93	178.752	192.084	685.410
Kalimantan	4.607.010	5.322.632	756.778	642.156	1.514.391	12.843.876	11.990.877
Sulawesi	337.408	202.501	136.166	72.522	2.020.903	2.769.499	5.409.923
Maluku	347.613	782.116	29.790	10.904	633.965	1.804.389	2.711.028
Papua	2.235.798	3.862.452	466.576	1.468.919	4.092.397	12.126.142	20.993.372
Total	7.695.487	10.7222.820	1.886.404	2.268.633	9.449.659	32.023.003	50.809.495

Continuous forest decline can result in the destruction of forest land which ultimately has a negative impact on life. Massive damage has an impact on biodiversity and reduces the productivity of forest products. Apart from that, forest destruction can also have an impact on people's lives, especially indigenous communities who depend on nature for their livelihoods. The negative impacts that occur

include flooding, landslides, erosion and sedimentation. Deforestation not only impacts on a national scale but can also impact the entire world. Problems related to forest fires, mining and illegal logging, expansion of residential areas can have an impact on the social and economic conditions of communities whose lifestyles depend on nature and increasingly severe conditions can also result in state losses (Nakita & Najicha, 2022).

Preserving forest resources is one solution in dealing with emissions-related problems. Forests that have the ability to absorb carbon dioxide and convert it into oxygen can help solve problems related to emissions. So that forest destruction without good management efforts will have a big impact on climate change which is related to the carbon in the air, apart from that, peat areas without trees that provide protection from exposure to sunlight directly release stored carbon into air. It is on this basis that preserving forest resources and preventing them from being damaged is an important role and shared responsibility.

Potential of Local Wisdom of Indigenous Peoples in Preventing Deforestation

Indigenous communities in forest areas have local wisdom in the form of habits and traditions related to how to manage natural resources, one of which is forests. The local wisdom of indigenous peoples has a wise tendency caused by the character of traditional thought patterns which are generally based on cosmic and communal thinking (Mardan & Ramadhan, 2022; Putri & Dinata, 2019). On this basis, the local wisdom of indigenous peoples has great potential in overcoming the main problems related to deforestation that occurs in Indonesia. Based on the results of the analysis, several local wisdoms of indigenous communities in Indonesia were found in managing forest resources. Data on indigenous communities who have local wisdom in sustainable forest resource management are presented as follows.

Local wisdom of Ammatoa Kajang, South Sulawesi

The Ammatoa Kajang indigenous community has a system of rules for forest management called tides. The community divides forests into sacred forests, border forests and community forests. This forest is used by indigenous peoples as a ritual forest and as an ecological forest. There are 10 rules of the Ammatoa indigenous community regarding environmental conservation which are presented in Table 3.

Table 3. Local Wisdom of the Ammatoa Indigenous People

Rule	Description
<i>Jagai linoa lollong bonena kammayya tompa langika siagang rupa taua siagang boronga Nikasipalliangngi ammanra'-manrakia borong Anjo boronga iya kontaki bosiya nasaba konre mae pangairangnga iaminjo boronga nikua pangairang</i>	Maintaining the earth and its contents, humans are not allowed to destroy forests.
<i>Punna nitabbangngi kajua riborongnga, nunipappirangnga Anggurangi bosu patanre timbusu. Nibicara pasang ri tau Ma'riolo Narie' kaloro battu riborongna, narie' timbusu battu rikajua na battu ri kalelengnga</i>	Forests are rain carriers, so forests function as irrigation If trees in the forest are cut down, it can affect rainfall so that water flow will disappear Forests and trees are sources of water. Because the forest functions to invite rain.
<i>Iyamintu akkiyo bosu anggenna ereya nipake a'lamung pare, ba'do appa'rie' timbusia Anjo tugasana Ammatoa nalarangngi annabbang kaju ri boronga.</i>	Forests that bring rain for farming, gardening and water sources. Ammatoa is tasked with protecting the forest.
<i>Iyaminjo nikua ada'tana Iyaminjo boronga kunne pusaka talakullei nitambai nanikurangi borong karama, nilarangngi tauwa a, lamung- lamung riborongna, nasaba se're hattu larie' tau angngakui bate lamunna</i>	This is the law here and the forest is the heritage of the ammatoa people The naturalness of customary forests must be maintained and the forests must not be cultivated, because one day they will be recognized as property rights.

Source: (Istiawati, 2016; Nur et al., 2022)

Local Wisdom of the Rumbio Indigenous Community, Kampar Regency, Riau

Kenagarian Rumbio or the Rumbio indigenous community is an indigenous people in the Kampar Regency area, Riau Province. One form of local wisdom of the Rumbio indigenous community is "Ghimbo laghangan" or forbidden forest. Indigenous community prohibitions are related to various

human actions that can damage and reduce forest functions. The local wisdom of the Rumbio traditional community is shown in [Table 4](#).

Table 4. Local Wisdom of the Rumbio Indigenous Community, Kampar Regency, Riau

Prohibited activities	Description
You cannot cut down trees	Tree felling activities are permitted if they are used for public purposes such as building a mosque and are approved by the traditional leader (ninik mamak).
It is not permissible to use forests for things that can reduce forest functions	It is not permitted to use forests for grazing livestock, planting production crops and other destructive activities
Do not use forest products excessively	Permitted uses include taking firewood, collecting honey, mushrooms, forest fruits, ornamental plants, medicinal plants, tree sap and so on. In terms of use, you must also obtain permission from the ninik mamak.
Not allowed to enter the forbidden customary forest without ninik mamak permission	Especially for outsiders (not the Kenagarian Rumbio indigenous community) if they want to enter the prohibited forest, they must ask for permission and must be guided by a person appointed by the ninik mamak.
You are not allowed to speak dirty words, be arrogant, be arrogant or do immoral things in the prohibited forest area	

Source: (Almegi, 2022)

Local Wisdom of the Indigenous People of South Buton

The people of South Buton apply local wisdom called "Kaombo" in managing forest resources. Kaombo local wisdom contains teachings to maintain and utilize natural resources (forest, land and water) in a sustainable manner. In forest management, the South Buton community divides the forest area into Turakia, Katampai, Ombo, Tanana Bagea and Tanana Koburu. The area is divided into prohibited areas, agricultural areas, hunting areas and burial areas. South Buton community forest management rules are presented in [Table 5](#).

Table 5. Local Wisdom of the South Buton Traditional Community

Prohibited activities	Description
It is not permitted to enter the "Kaombo" prohibited forest to carry out plantation activities	If you violate the rules, there are sanctions in the form of warnings and social punishments as well as fines.
You are not allowed to manage agricultural land personally	Forest land must be determined based on the results of deliberations
It is not permitted to take wood in the prohibited forest area "Kaombo"	The wood in the kaombo area is only intended for traditional ceremonial purposes

Source: (Mardan & Ramadhan, 2022)

Local Wisdom of the Kasepuhan Cipta Gelar Community

The Kasepuhan Ciptagelar indigenous community is in the Sukabumi district. The Kasepuhan Ciptagelar community believes that forests are the center of life for humans, so humans are obliged to preserve them. Every day, the community will always interact with the forest to fulfill life's needs, including construction materials, food supply, water availability and the continuity of community life for the next generation. The Kasepuhan traditional community divides the forest area into three areas including: (1) Arable Forest: this forest is used for residential areas, rice fields and farming; (2) Covered Forest: this forest functions as a buffer forest for entrusted forests. Forest products in the form of wood and non-wood can be used by following customary rules; and (3) Entrusted Forest: this forest is a sacred forest where no utilization activities are permitted. Utilizing entrusted forests means violating customary rules. Customary community rules in forest management and utilization are aimed at preserving forests. These customary rules are presented in [Table 6](#).

Table 6. Local Wisdom of the Kasepuhan Indigenous Community

Type of Utilization	Description
Utilization of wood for traditional house construction	<ol style="list-style-type: none"> 1. Before felling a tree, you are required to plant a tree first. The felling of one tree is replaced by 50 tree seedlings. 2. Must carry out permits with traditional stakeholders 3. Logging wood near spring areas is not permitted 4. Logging is only obtained for house construction needs 5. Forest products in the form of wood cannot be bought and sold
Utilization of bamboo for construction of walls of traditional houses.	<ol style="list-style-type: none"> 1. Bamboo felling is only permitted for wall construction 2. Logging results cannot be sold 3. These rules apply if bamboo felling is carried out in a forest area. Meanwhile, if logging is carried out in the yard of the house, these traditional rituals are not required

Source: (Bagus Prabowo, 2021; Samsuri, 2015)

Local Wisdom of the Marena Indigenous Community, Enrekang Regency

The Marena indigenous community is a community that lives in an area with a total area of 676.34 Ha with a forest area of 155 Ha. This traditional community manages forest resources by dividing the forest area into two, namely the Pangngala Mangkarama' forest (sacred forest) and Pangngala To Bisa Dijama (forest managed by traditional communities). In forest management, the Marena traditional community has special rules which are described in [Table 7](#).

Table 7. Local Wisdom of the Marena Indigenous People

Prohibited activities	Description
Eda wa'ding ala kaju ke eda na dipetada (it is forbidden to take wood)	If you take wood without the approval of the traditional authority, it will be expelled from the traditional territory
Eda wa'ding Bela pannggala (forbidden to cut down the forest)	If you cut down the forest, you won't be given water for gardening or rice fields
Eda wa'ding sumpun pannggala (Forbidden to burn the forest)	If you burn the forest, you are required to slaughter the buffalo
It is not permitted to take wood in the prohibited forest area "Kaombo"	The wood in the kaombo area is only intended for traditional ceremonial purposes

Source: (Jamaluddin et al., 2023)

Based on various forms of local wisdom of indigenous peoples in Indonesia, it shows that local wisdom of indigenous peoples has great potential in reducing the rate of deforestation. The perspective, attitudes and regulations in managing forest resources by indigenous communities reflect sustainable management. Indigenous communities not only view forest resources as economic objects that can be utilized but also maintain the ecological function of forests in supporting the continuity of life. This is in line with the opinion of [Almegi, \(2022\)](#) that the internalization of local wisdom values can make a positive contribution to forest conservation, through realizing the rights and authority of local indigenous communities. By optimizing the existing potential, problems caused by deforestation such as loss of biodiversity, water sources, forest fertility and oxygen availability can be overcome ([Jamaluddin et al., 2023](#)).

The existing potential must also be supported by the government's commitment to achieving these goals. Strengthening indigenous communities as institutions that are recognized and given rights to manage forest resources must be accommodated ([Samsuri, 2015](#)). Furthermore, what is more important is the provision of forest land that can be managed by indigenous communities so that there is no inequality, such as data [Forest Watch Indonesia, \(2019\)](#) that the distribution of permits for corporations/private sectors in Kalimantan, which reaches up to 60% percent of the region's land area, is very large when compared with the 1.4 percent of land given to communities through social forestry. Apart from Kalimantan, there is also the Papua region where the disparity in granting permits is very high, namely

with a total land area of around 40 million hectares, 36 percent of the land in Papua is given to corporations while only 0.3% is given to the community. The government's commitment to involving the community and pressing the forest land concession licensing process is a determining factor in reducing the rate of forest deforestation in Indonesia.

Conclusion

The local wisdom of indigenous peoples has great potential in efforts to prevent deforestation in Indonesia. The high rate of deforestation caused by the government's ease in granting forest land concession permits can be prevented by involving and implementing sustainable forest resource management regulations such as those applied by indigenous communities. The perspective, attitudes and rules of indigenous peoples can be a solution in dealing with the rate of forest deforestation so that they can maintain the function of the forest as an economic function as well as the ecological function of the forest as a source of water, oxygen and biodiversity.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

K.A. and **E.F.S.R.:** analysis, review and editing, **L.H.** and **Z.W.R.:** Introduction, **P.S.** and **F.T.A.:** methodology; **J.R.:** analysis and translator.

References

- Adlini, M. N., Dinda, A. H., Yulinda, S., & Chotimah, O. (2022). Metode Penelitian Kualitatif Studi Pustaka. *Edumapsul: Jurnal Pendidikan*, 6(1), 974–980. ummaspul. <https://e-journal.id/maspujlr/article/view/3394>
- Almegi. (2022). Kearifan Lingkungan Masyarakat Adat Kenagarianrumbio, Kabupaten Kampar Dalam Menjagakelestarian Hutan. *Tsaqifa Nusantara*, 1(1). <https://doi.org/10.24014/tsaqifa.v1i1.16544>
- Arif, A. (2016). Analisis Yuridis pengrusakan Hutan (Deforestasi) Dandegradasi Hutan Terhadap Lingkungan. *Jurisprudentie*, 3(1). <https://doi.org/10.24252/jurisprudentie.v3i1.3622>
- Bagus, P.Y. (2021). Kasepuhan Ciptagelar: Pertanian Sebagai Simbol Budaya & Keselarasan Alam. *Jurnal Adat Dan Budaya*, 3(1). <https://doi.org/10.23887/jabi.v3i1.31102>
- Dita, S.L., & Prasetyo, Y. (2018). Analisis Deforestasi Hutan Di Provinsi Riau Dengan Metode Polarimetrik Dalam Pengindraan Jauh. *Jurnal Geodesi Undip Januari*, 7(1). <https://doi.org/10.14710/jgundip.2017.19330>
- Djaenudin, D., & Dwiprabowo, H. (2018). Analysis of Probability for Achieving the Reduction of Deforestation Rate: Forest Transition Theory Approach. *Jurnal Penelitian Sosial Dan Ekonomi Kehutanan*, 15(1). <https://doi.org/10.20886/jpsek.2017.15.1.15-29>
- Fahyumi, R., & Muzani, J. (2022). Pengelolaan Sumber Daya Hutan Berbasis Kearifan Lokal Pada Masyarakat Bali. *Jurnal Hutan Dan Masyarakat*, 14(1). <https://journal.unhas.ac.id/index.php/jhm/article/view/14396>
- Food and Agriculture Organization. (2020). Global Forest Resources Assessment 2020. In *Global Forest Resources Assessment 2020*. FAO. <https://doi.org/10.4060/ca8753en>
- Forest Watch Indonesia. (2019). *Angka Deforestasi Sebagai "Alarm" Memburuknya Hutan Indonesia Lembar Fakta*. fwi.or.id/angka-deforestasi-sebagai-alarm-memburuknya-hutan-indo/ %0A
- Forest Watch Indonesia. (2020). *Jalan Deforestasi Indonesia*. <https://doi.org/10.4060/ca8753en>.
- Herutomo, C., & Istiyanto, S. B. (2021). Komunikasi Lingkungan Dalam Mengembangkan Kelestarian Hutan. *WACANA: Jurnal Ilmiah Ilmu Komunikasi*, 20(1). <https://doi.org/10.32509/wacana.v20i1.1165>
- Holilur, H.M., Anggraini, P., Nurul Amalia, C., Aqda Miena Asyafin, T., Abdillah Akbar, I., & Imamatut Tamami, S. (2022). Pengaruh Kebudayaan Masyarakat Kampung Naga Terhadap Kondisi Lingkungan dan Kehidupan Masyarakat. *Majalah Pembelajaran Geografi*, 5(2). <https://doi.org/>

- 10.19184/pgeo.v5i2.36075
- Istiawati, N. F. (2016). Pendidikan Karakter Berbasis Nilai-Nilai Kearifan Lokal Adat Ammatoa Dalam Menumbuhkan Karakter Konservasi. *Cendekia*, 10(1). <https://doi.org/10.30957/cendekia.v10i1.78>
- Jamaluddin, J., Hajawa, H., Hasanuddin, H., Daud, M., Naufal, N., & Nirwana, N. (2023). Kearifan Lokal Dalam Pengelolaan Hutan Dihutan Adat Marena Di Desa Pekalobeankecamatan Anggeraja Kabupaten Enrekang. *Forest Services*, 1(1). <https://doi.org/10.2429/fces01>
- Jhon, W. (2021). Challenges in the implementation of character education in elementary school: experience from Indonesia. *Ilköğretim Online*, 20(1), 1351–1363. <https://doi.org/10.17051/ilkonline.2021.01.130>
- KLHK. (2022). *Pemantauan Deforestasi Indonesia tahun 2020-2021*. Direktorat Inventarisasi dan Pemantauan Sumber Daya Hutan, Ditjen Planologi Kehutanan dan Tata Lingkungan Kementerian Lingkungan Hidup dan Kehutanan.
- Liu, R., Liu, H. C., Shi, H., & Gu, X. (2023). Occupational health and safety risk assessment: A systematic literature review of models, methods, and applications. *Safety Science*, 160(August 2022), 106050. <https://doi.org/10.1016/j.ssci.2022.106050>
- Mardan, N., & Ramadhan, S. (2022). Pengelolaan Hutan Berbasis Kearifan Lokal Masyarakat Buton Selatan. *Administratio: Jurnal Ilmiah Ilmu Administrasi Negara*, 11(1). <https://ejournal.lppmunidayan.ac.id/index.php/administratio/>
- Murti, W., & Maya, S. (2021). *Pengelolaan Sumber Daya Alam* (1st ed.). Widina Bhakti Persada.
- Najib, N. N., Hanindiyasari, L., & Sari, D. (2024). Rules and Local Traditions : Forest Conservation by the Indigenous People in North Luwu Regency. *Jurnal Ilmu Sosial Dan Humaniora*, 13(2), 285–291. <https://doi.org/doi.org/10.23887/jish.v13i2.75963> Rules
- Nakita, C., & Najjicha, F. U. (2022). Pengaruh Deforestasi dan Upaya Menjaga Kelestarian Hutan di Indonesia. *Jurnal Ius Civile*, 6(1). <https://doi.org/doi.org/10.35308/jic.v6i1.4656>
- Nur, M. S., Zid, M., & Setiawan, C. (2022). Pengelolaan lahan dan ruang hutan dengan perspektif kearifan lokal komunitas Ammatoa Kajang sebagai usaha konservatif. *Jurnal Pengelolaan Lingkungan Berkelanjutan (Journal of Environmental Sustainability Management)*, 90–105. <https://doi.org/10.36813/jplb.6.2.90-105>
- Nur, R. M. (2020). Mengatasi Perubahan Iklim: Bom Waktu Deforestasi di Indonesia. *Centre for Strategic and International Studies*, 1–14. <https://doi.org/10.36813/jplb.6.2.90-105>
- Purwatiningsih, S. D. (2022). Pemahaman Masyarakat Sekitar Hutan Pada Informasi Konservasi Hutan Dalam Memanfaatkan dan Melestarikan Hutan Taman Nasional Gunung Halimun Salak. *IKRAITH-HUMANIORA*, 6(1). <https://doi.org/10.37817/ikraith-humaniora.v6i1>
- Putri, L. D., & Dinata, M. (2019). The Study Trees Potential for Forest in Universitas Lancang Kuning Pekanbaru. *Eksakta*, 20(1), 77–84. <https://doi.org/10.24036/eksakta/vol20-iss01/176>
- Rahman, A., & Bakri, R. (2020). Efektifitas Lembaga Adat Dalam Rangka Pelestarian Hutan Gunung Kiyangan Desa Rembitan Kecamatan Pujut Kabupaten Lombok Tengah. *Pallangga Praja*, 2(1). <https://doi.org/10.33701/jpp.v2i1.1643>
- Samsuri, H. (2015). *Kearifan Lokal Masyarakat Adat Kasepuhan Ciptagelar Dalam Pengelolaan Hutan*. https://etd.repository.ugm.ac.id/home/detail_pencarian/80387%0A
- Sari, M., & Asmendri. (2020). Penelitian Kepustakaan (Library Research) dalam Penelitian Pendidikan IPA. *Natural Science : Jurnal Penelitian Bidang IPA Dan Pendidikan IPA*, 6(1), 41–53. <https://ejournal.uinib.ac.id/jurnal/index.php/naturalscience/article/view/1555>
- Sembiring, N., Napitupulu, H. L., & Sembiring, M. T. (2020). Eucalyptus replanting model representation for sustainable productivity : A review Eucalyptus replanting model representation for sustainable productivity : A review. *Journal of Physics: Conference Series*, 974, 1–7. <https://doi.org/10.1088/1755-1315/974/1/012107>
- Wiasti, N. M. (2016). Kearifan Lingkungan Masyarakat Desa Jatiluwih : Relevansinya Dengan Pelestarian Warisan Budaya Dunia. *Bumi Lestari*, 15(1). <https://jurnal.harianregional.com/blje/id-18556>
- Widodo, P., & Sidik, A. J. (2018). Perubahan Tutupan Lahan Hutan Lindung Gunungguntur Tahun 2014 Sampai Dengan Tahun 2017. *Wanamukti*, 21(1). <https://journal.unwim.ac.id/index.php/wanamukti/article/view/153>