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Perception, attitude, and motive of local community towards forest conversion to plantation in Dharmasraya District, West Sumatra, Indonesia

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Abstract. *Rangga KK, Yonariza, Yanfika H, Mutolib A. 2020. Perception, attitude, and motive of local community towards forest conversion to plantation in Dharmasraya District, West Sumatra, Indonesia. Biodiversitas 21: 4903-4910.* Forest conversion in Dharmasraya District massively occurred from 2000 to 2014. In 2000, forest area reached 86% of 33,550 h[illegible]n 2014, forest cover reduced to only 16% with an increase in plantation area (rubber and oil palm), covering 59% of the total area. This study was aimed to examine the perce[illegible]n, attitude, and motive of the local community regarding forest conversion to the plantation. This study was located in PFMU (Production Forest Management Unit) Dharmasraya West Sumatra, which included a production forest area. This study was conducted from February to August 2018 with a case study a[illegible]proach. A total of 40 households, was selected as respondents. Snowball sampling was applied to interview the key informants. Data were analyzed using the interactive model, which included data reduction, data presentation, also conclusion drawing and verifi[illegible]on. The study result indicated that forest is owned by the local community based upon the customary law, and the state does not have the right to manage and claim forest ownership. In terms of the economic aspect, the community benefited greatly from wood availability in the forest as the source of income. According to the local community, the conversion of forests into plantation did not have a significant effect on the environment. In fact, the local community agreed that land-use change from forest to plantation will provide greater benefit than preserving the forest. The expansion of plantation was found to be the motive for land clearance by cutting trees to obtain ownership over the forest.

Keywords: Forest land-use change, motive, perception, PFMU Dharmasraya, plantation

Abbreviations: GIS: geographic information system, HTI: *Hutan Tanaman Industri*(Industrial Forest Plantation/IFP), HPH: *Hak Pengelolaan Hutan* (Forest Concession License), HGU: *Hak Guna Usaha* (land-use right to exploit), KAN: *Ketua Kerapatan Adat Nagari* (Assembly of *Adat Nagari*), NDVI: Normalized Difference Vegetation Index, PFMU Dharmasraya: Production Forest Management Unit Dharmasraya

INTRODUCTION

Indonesia has the third-largest tropical for[illegible] globally and the first in Asia after Brazil and the Democratic Republic of the Congo (Andini 2017; Armida et al. 2017; Juarez-Orozco et al. 2017). According to the Ministry of Environment, in 2018, Indonesia's tropical forest and water conservation areas reached 125,9 million hectares[illegible]n terms of function, Indonesia's forest area is classified into three functions: Production Forest of 68.8 million hectares, Protection Forest of 29.7 million hectares, and Conservation Forest of 22.1 million hectares (Ministry of Forestry Republic Indonesia 2018). However, deforestation has threatened Indonesia's forest existence (Tacconia et al. 2009) and impact on climate change globally (Rahm[illegible]t al. 2019; Murniati and Mutolib 2020). Indonesia's rate of deforestation reached 1.3 million per year between 2000 and 2012 (Wegscheider et al. 2018). The primary factor causing forest deforestation in[illegible]es the expansion of small-scale agriculture (Mutolib et[illegible] 2017; Austin et al. 2019), oil palm plantation (Eldeeb et al. 2015, Vijay et al. 2016), illegal logging (Khalid et al. 2019), corruption (Eldeeb 2015; Pachmann 2018), granting of forest concession (Santika et al. 2017; Chen 2019), and human settlement (Nugroho et al. 2018; Husodo et al. 2019).

About 48 million people of Indonesia live around the forest area and highly depend on forest products (Mccarthy and Robinson 2016; Fisher et al. 2018). Forest is inseparable from the community life for its function as the source of food, medicines, and income (Aju 2014). The relationship between forest and community in Indone[illegible]is supported by the existence of customary law (Marta et al. 2019; Dasrizal et al. 2019; Ifrani et al. 2019) that provides the opportunity for the local community to manage forest areas (Mutolib et al. 2020; Lestawi and Bunga 2020). Several studies have shown that the local community can perform proper and sustainable forest management (Handoko 2014; Matsvange et al. 2016; Poudyal et al. 2019).

Legal pluralism of forest ownership in Indonesia occurs due to forest claims between the state and local/customary lawful communities (Mutolib et al. 2017). Forest is claimed as state-owned property, while it is also claimed as

ulayat/customary forest by the indigenous community (Muur 2018). The Decision of the Constitutional Court No. 35/PUU-X/2020 reviewing Law No. 41 in 1999 has removed customary forest from state forest (Subarudi 2014). Before The Decision of the Constitutional Court No. 35/PUU-X/2020, the customary forest is claimed as state forest. Thus local/customary communities must obtain a permit from the government to manage the forest. The government continues to reduce community activity around the forest. It can damage forest sustainability (Surati 2014; Purwawangsa 2017), even though several studies observed that the customary community could preserve the forest (Handoko 2014; Matsvange et al. 2016; Poudyal et al. 2019). Still, an in-depth study is necessary to examine facts regarding customary community and efforts to sustain forest area, whether the customary community can preserve the forest if they manage it themselves, and ensure that forest management by the local community will have an impact on forest sustainability.

One of the areas where customary law exists and develops within the community life is the area inhabited by Minangkabau ethnic in the West Sumatra Province. This province has an area of 42.2 thousand km^2, and about 56.27% of the administrative area is state-owned forest. The Forest area in West Sumatra consists of the area for conservation (806,939), protection (791,671 ha), and production (731,448 ha) (West Sumatra Forestry Service 2018). This study was conducted in Dharmasraya District with a total forest area of 53.594 ha (West Sumatra Forestry Service 2018), yet massive forest conversion continuously occurs. Deforestation and land-use change in Dharmasraya District is an interesting topic to investigate since it is believed that the local community is involved in forest conversion. If local communities are involved in deforestation, this is an interesting finding on local communities' role in forest management in Indonesia. This study aimed to investigate the local community's perception, attitude, and motive towards forest conversion to the plantation. The finding of this research is expected to provide new information regarding the motive and reason for community-related to the forest conversion process.

MATERIALS AND METHODS

Study area and time research

The study was carried out in the Dharmasraya District, which is geographically located at the southeast end of West Sumatra Province, Indonesia with geographical coordinates between 000 47' 7"-010 41' 56" S and 1010 9' 21"-1010 54' 27" E. Dhamasraya District is mostly flatland in term of topography at an elevation of 82-5,525 meter above sea level. Specifically, the study site is under the area of Production Forest Management Unit (PFMU) Dharmasraya, which includes a total production forest area of 33,550 ha (Figure 1). PFMU Dharmasraya is administratively under Nagari Bonjol and Nagari Abai Siat in Koto Besar Subdistrict, and Nagari Sikabau and Nagari Sungai Dareh in Pulau Punjung Subdistrict. Forest in PFMU Dharmasraya is also an *ulayat* (customary forest) belongs to the local community living in the four Nagari. However, Nagari Bonjol was selected as the main focus in this study by taking into consideration that PFMU Dharmasraya is legally (adat law) owned by the local community of Nagari Bonjol. The area of customary forest owned by the local community in Nagari Bonjol is estimated to be between 66,000 and 100,000 ha covering the concession area of PT Ragusa (66,000) and others (Mutolib et al. 2016).

The time and stage of the study were divided into two stages. The first stage of the study was a preliminary study to identify research sites and forest management problems. A preliminary study was conducted in January 2016. Data collection to answer the research objective was done from February to August 2018.

Methods and source of data

The study applied a qualitative experimental design with a case study approach. Format of qualitative study aims to describe, to summarize various conditions, situations, or phenomena of social reality, or study that collects and analyzes data in the form of words (oral and written) and human behavior without attempts to quantify the data obtained (Afrizal 2015). This study used both primary and secondary data. Primary data were obtained through a household survey, interview with key informants, direct observation, and documentation. A total of 40 households in Nagari Bonjol, directly and indirectly, related to forest clearance, were selected as respondents. The number of respondents is 10% of the total population. In qualitative research, the level of research validity is obtained based on data information, not based on the number of respondents. Informants in this study were determined using the method of snowball sampling. Secondary data were obtained from the literature study and documents from many institutions related to this study.

Through a non-ethnographic qualitative approach, the data collection technique was applied since the author did not participate in the social life of a group/community for data collection (Afrizal 2015). Key informants were the local community, company/permit holder, relevant institutions (government), and buyers who performed plantation farming in PFMU Dharmasraya. Key informants in the local community included the customary/*ulayat* leader, leader of *Nagari*, *Ninik Mamak*, and Chairman of the Assembly of *Adat Nagari* (KAN, *Ketua Kerapatan Adat Nagari*) intending to collect information related to forest clearance viewed from the aspect of customary law.

The identification of forest cover changes was analyzed by satellite imagery. Map Obtained from the earthexplorer.usgs.gov website and downloaded by the data of the year that searched. Landsat map data processed using the NDVI (Normalized Difference Vegetation Index) method to obtain cover distribution in PFMU Dharmasraya.

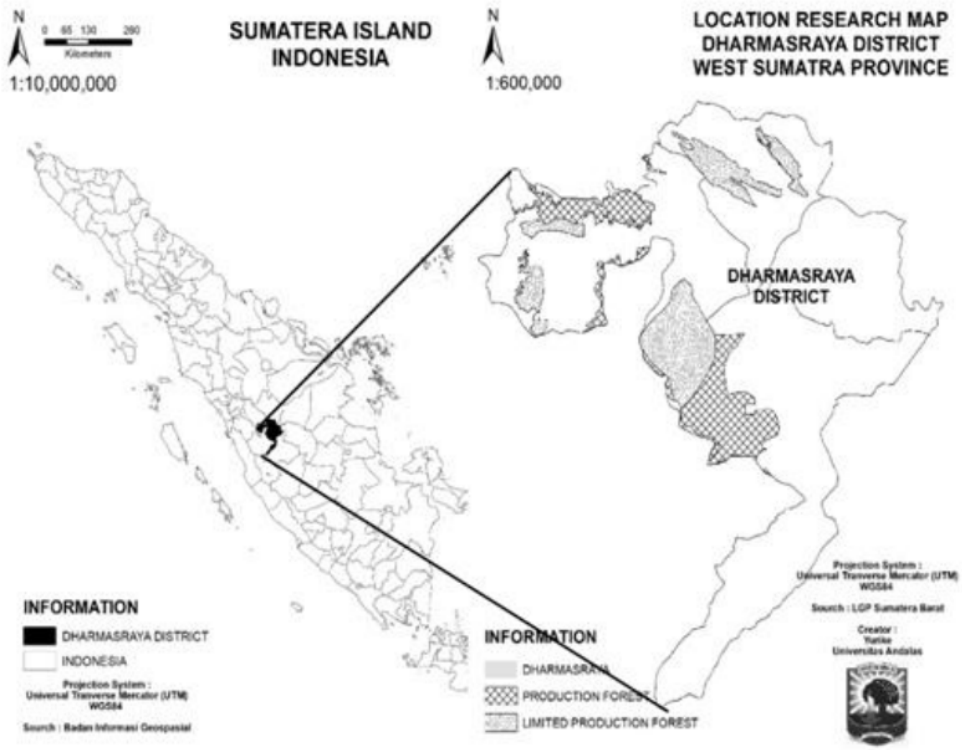

Figure 1. Location of the Production Forest Management Unit (PFMU) Dharmasraya, West Sumatra Province, Indonesia (Source: Yurike et al. 2018)

Data analysis

Data in this study were analyzed using the ongoing approach, which was not performed after data were collected entirely, but following the problem formulation, before field observation. Data analysis in qualitative study was continuously done from the beginning of the proposal drafting process until study result writing (Afrizal 2015). Stages conducting during the data collection and analysis activities in the qualitative study are inseparable; thus, it is simultaneously done. Data analysis was applied using the interactive model in this study, including data reduction, data presentation, conclusion drawing, and verification (Miles et al. 2014).

The identification of forest cover changes was analyzed by satellite imagery. Map Obtained from the earthexplorer.usgs.gov website and downloaded by the data of the year that searched. Landsat map data processed using the NDVI method to obtain cover distribution in PFMU Dharmasraya. NDVI results were corrected by natural composite bands (bands 4-3-2). This merger aims to facilitate the analysis of NDVI data processing from Landsat imagery. NDVI calculations are (NIR-Red)/(NIR-Red). Image processing using Arc GIS 10.3. Calculation of the area of land use data using the raster calculator tools—threshold values adjusted to the actual state of the original composite band results.

RESULTS AND DISCUSSION

History of forest management in Dharmasraya

In 1972, Forest Concession License (HPH, Hak Pengelolaan Hutan) for 30 years was granted to PT. Ragusa for forest area of 66,000 ha, which expired in 2002. In 1986 and 1998, PT Incasi Raya and PT. Selago Makmur Plantation (SMP), respectively, obtained land-use right to exploit (HGU, Hak Guna Usaha) some of the forest areas to be further converted into oil palm plantation. During this period, local communities had a weak position, even though they refused to recognize forests claimed as state forests. After the reformation, local communities reclaimed the forests that were taken by the state and companies.

Following the expiration of HPH in 2002, land-use right was granted to PT Inhutani, thus the forest has later functioned as the Industrial Forest Plantation (HTI, *Hutan Tanaman Industri*). PT Inhutani IV was given a permit to manage a forest area of 40.000 Ha for IFP. The IFP was developed to reduce illegal logging and forest encroachment done by the local community. However, PT Inhutani IV, as the operator of forest management, was considered failed to manage the forest area. Thus other companies, namely PT Dara Silva Lestari (DSL) and PT Bukit Raya Mudisa (BRM) was granted a forest concession license for some of the forest areas in 2009. The unclear

forest management results in forest damage and conflict between stakeholders claiming forest ownership (Sylviani and Hakim 2014).

In 2013, the Industrial Forest Plantation (IFP) of PT Inhutani, DSL, and BRM were established as PFMU Dharmasraya by the Ministry of Environment. The total forest area managed by PFMU is approximately 33,550 ha. The PFMU does not have the function as a permit holder. It serves as a forest management operator responsible for ensuring the forest is managed correctly according to its function.

Table 1. Development of plantation in PFMU Dharmasraya in 2000-2014

Forest cover	Percentage of total 32,749 ha (year)			
	2000	2005	2011	2014
Secondary forest	86.35	71.81	40.01	18.89
Plantation	10.24	23.61	52.91	59.00
Open land/bushes	3.41	4.58	7.08	22.11
Total (100%)	100.00	100.00	100.00	100.00

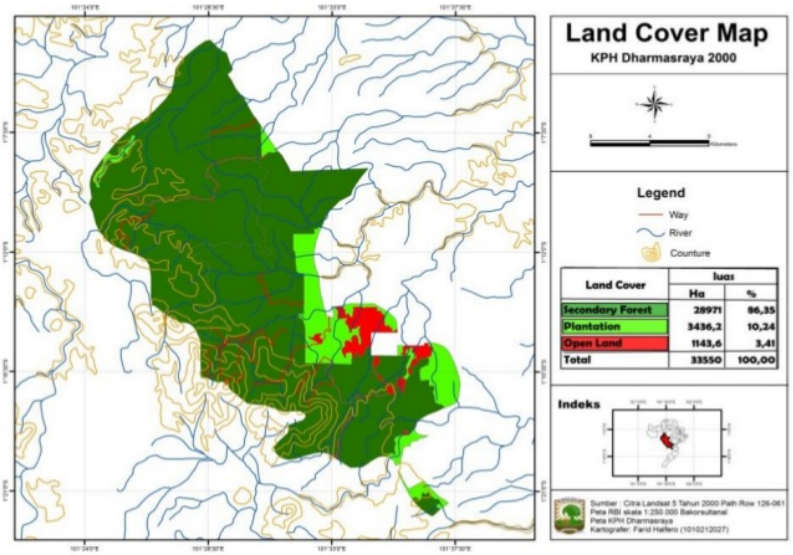

Figure 2. Forest cover in PFMU Dharmasraya, West Sumatra, Indonesia in 2000

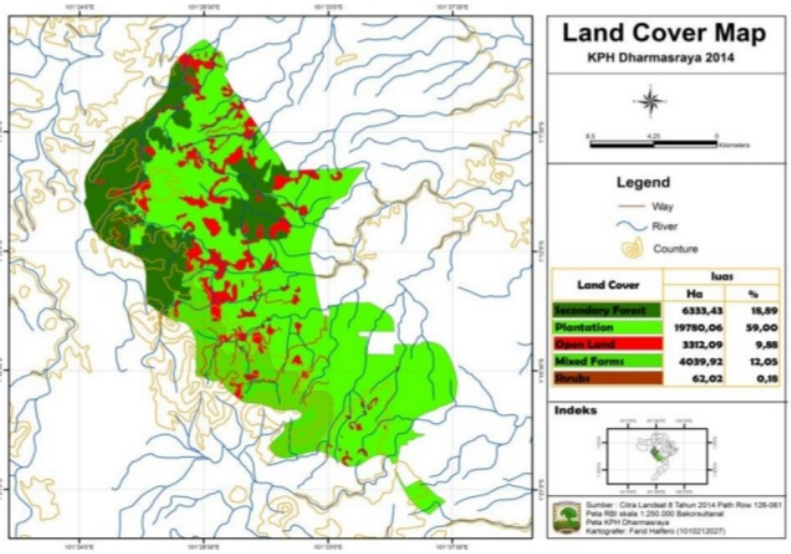

Figure 3. Forest cover in PFMU Dharmasraya, West Sumatra, Indonesia in 2014

Forest conversion to plantation

Analysis result of geographic information system (GIS) analysis between 2000-2014 depicted rapid deforestation in PFMU Dharmasraya. In 2000, secondary forest in PFMU Dharmasraya reached 86% of the total area, while open land and plantation areas were only 3% and 10% of the total area. However, at the end of 2014, forest cover significantly decreased to only 16% of the total area. Plantation (rubber and oil palm) experienced a significant increase from 10% in 2000 to 59% in 2014 (Figures 2 and 3, and Table 1).

Forest conversion to the plantation in PFMU Dharmasraya was supported by the ease of access to the forest through the former HPH project road. The former HPH road was built by the company to transport the wood from the forest. High plantation commodity prices, population growth, land requirement for agriculture and plantation, and the high number of people who wanted to own plantation area, either the local community around Bonjol or those living outside the Dharmasraya District. Technological advances play a role in disseminating information about forest encroachment, including buying and selling forests (Yanfika et al. 2019; Listiana et al. 2019). Agricultural expansion was also considered one of the factors causing deforestation (Dalla-Nora et al. 2014). In addition to those situations, forest conversion in PFMU Dharmasraya was also motivated by plantation expansion. At the same time, PFMU Dharmasraya as the operator of forest area management, did not make any efforts to prevent the deforestation because the claim of the forest as customary land is powerful compared to claims of the forest as property owned by the state

Perception and attitude of local community towards forest conversion

Forest conversion in PFMU Dharmasraya is an interesting topic to investigate. An important aspect of forest conversion in PFMU Dharmasraya is the local community's collective action to convert forest into the plantation. Based on the study result, all respondents (100%) perceived that the local/customary communities own forest. They claimed that the state does not have the right for forest management since the local community has managed and controlled forests even before this state/country existed. The entire community (100%) rejected the regulation related to forest use under state law (Table 2). The forest recognition as the customary property is higher than the state because the local people had lived in forest areas even before the state was founded.

Table 2. Perception and attitude of local community towards forest conversion to plantation in Dharmasraya District, West Sumatra, Indonesia

No.	Statement	Response (%)	
1.	**Ownership of forest**	**State**	**Custom**
	Forest ownership in PFMU Dharmasraya	100.00	0.00
	PFMU Dharmasraya forest is owned by customary community	Yes (100.00)	
	Local/customary community is the most appropriate party to manage forest	Yes (100.00)	
	Those intend to manage forest must obtain permit from the government/state	No (100.00)	
2.	**Benefit of forest**	**Yes**	**No**
	a. Direct economic uses (Timber, mining, hunting)	77.50	22.50
	b. Direct health benefits (General welfare, medicine)	42.50	47.50
	c. Environmental health benefits (Cool shade, source of water, clear air, flood prevention)	60.00	40.00
	d. Other forest uses (Fish, forest gardens)	17.50	82.50
3.	**Perception of local community: impact of forest conversion to economic aspect**	**Yes**	**No**
	a. Deforestation decreases community income	12.50	87.50
	b. Deforestation eliminates source of job	7.50	92.50
	c. Deforestation eliminates source of food	17.50	82.50
4.	**Perception of local community: impact of forest conversion to environmental aspect**	**Yes**	**No**
	a. Deforestation causes microclimate (uncertain weather)	37.50	62.50
	b. Deforestation causes declining supply of clean water	32.50	67.50
	c. Deforestation causes drought in dry season	25.00	75.00
	d. Deforestation causes floods in rain season	57.50	42.50
5.	**Attitude in land clearance**	**Yes**	**No**
	Do you agree to clear forest for plantation?	100.00	0.00
	Felling hutan memberikan dampak negatif	92.50	7.50
	The greatest benefit of forest is obtained by preserving forest	0.00	100.00
	The greatest benefit of forest is obtained by converting forest to plantation	100.00	0.00

The community perceived that forest provides an economic benefit (77.50%), direct health benefits (42.50%), environmental health benefits (60%), dan other forest uses (17.50%). According to the local community, the most significant benefit of the forest is wood availability, which can be used as the source of income. Despite its economic benefit, the community thought that forest existence does not significantly contribute to the economy (Table 2 No. 3). Forest cannot improve the community's economic standard of living. Hence, the impact of forest conversion in terms of economic aspect (the loss of the source of income, employment, and food) was considered low by the local community (below 20%). The community believed that forest existence does not significantly contribute to the economy. Thus forest conversion to the plantation is the best option for forest management.

In terms of the environmental aspect, the conversion of forest into plantation did not significantly impact the environment. It was observed that the local community experienced climate change, such as a longer dry season, uncertain rainy season, decreasing water supply, and floods during the rainy season. However, they believed these events are not caused by forest conversion to plantation since environmental change is a common thing that occurs in most regions.

The local community agreed on the activity to convert forest into plantation because they considered that forest conversion would have a better impact on the economy than forest preservation. Only about 7.50% of the local community experienced the negative impact of forest conversion, but forest conversion's positive impact was still considered higher. The positive impact mostly perceived by the local community due to forest conversion was the expansion of the plantation area and an increase in community income. The community agreed with the statement, "The best benefit provided by forest is obtained by converting the forest to the plantation". Forest conversion to plantation leads to a direct impact on the economy's aspect and opened farming opportunities and increased the community's economy in Nagari Bonjol and its surrounding area through rubber and oil palm plantation.

Motive for forest conversion

The primary motive for forest conversion was found to be forest clearing for agricultural and plantation purposes. Another motive underlined forest clearance was forest felling as a mark of ownership over the forest. The cleared forest was left uncultivated since the purpose of forest clearance was to claim that the forest belongs to those conducting forest clearing. The motive for clearing forest to obtain ownership over the forest includes: ensuring forest ownership to run farming business in the future, as a mark of ownership for any parties who want to use/buy the cleared forest, and obtaining compensation from the state or company if the forest is taken over. Forest clearance in PFMU Dharmasraya mostly done through fire because be more effective and inexpensive.

Another motive for forest conversion is illegal logging. Based on the applicable customary law in PFMU Dharmasraya, illegal logging is illegal (by local law and local perspective). Anyone obtaining the permit from the leader of ulayat is allowed to take wood from PFMU Dharmasraya. The local community does not agree on the state law regarding forest ownership in PFMU Dharmasraya. It is an evidence of forum shopping in law pluralism where one party (the community) tends to choose and obey customary law to use the forest as it allows them to cut down trees and clear the forest. To the local community, customary laws are considered to provide more benefits compared to state law. According to the customary law, the forest in PFMU Dharmasraya belongs to ulayat (communal land) of Nagari Bonjol. Thus anyone intends to perform logging and clearing forest only needs to obtain a permit from the leader of ulayat.

In PFMU Dharmasraya, collecting wood in the forest is seized as an opportunity to build road access to the forest. Forest with better road access is more expensive than that with poor road access. This situation later triggers the community to collect wood in the forest, thus accelerating forest conversion in PFMU Dharmasraya.

In conclusion, the local community believes that the forest is owned by the customary community, not the state. Therefore, the state does not have the right to forest management since the local community had managed the forest even before this state/country existed. The local community rejects the regulation stating those who want to utilize forests must obtain such permission from the government. The community perceived that forest provides an economic benefit (77.50%), direct health benefits (42.50%), environmental health benefits (60%), and other forest uses (17.50%). However, according to the local community, the most significant benefit provided by forest is wood availability. The community thought that forest existence does not provide a significant contribution to the aspect of the economy. Thus forest conversion to the plantation is the best option for forest management.

Conversion of the forest into plantation did not result in a significant impact to the environment. Although the local community experienced climate change, the local community still believed that climate change is not caused by forest conversion to the plantation. The local community agreed on the activity to convert forest into plantation because the local community considered that forest conversion would have a better impact on the economy than forest preservation. About 7.50% of the local community experienced the negative impact of forest conversion, but forest conversion's positive impact was still considered higher. The positive impact mostly perceived by the local community due to forest conversion was the expansion of the plantation area and an increase in community income.

The primary motive was found to be forest clearing for agricultural and plantation purposes. Another motive underlined forest clearance was forest felling as a mark of ownership over the forest. The cleared forest was left uncultivated since the purpose of forest clearance was to claim that the forest belongs to those conducting forest clearing. The findings of this study provide a new perspective on local communities and forests. The local

community has the opportunity to be the party who can protect the forest and vice versa. For this reason, reasonable efforts and regulations are needed to empower local communities to conserve forests. However, the case in Dharmasraya cannot be generalized to all local communities in Indonesia in forest management.

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