

Article

# Ethnoecology: The Community Adaptation Patterns of Forest Management in Grobogan Central Java

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**Abstract.** This study aims to describe community adaptation patterns and determine community perceptions regarding forest management. This qualitative study was studied using an ethnoecological approach with the study focus being the people of the Perhutani area of Grobogan Regency. Data collection was carried out through interviews, field observation and documentation, with the main informants and supporting informants were the Pesanggem as the forest land managers. Informants were selected using purposive sampling. The first study finding is the form of community adaptation patterns in managing the forest which covering three aspects, namely ecological adaptation, economic adaptation, and social adaptation in the Pesanggem community in Gedangan Village, Wirosari District under the auspices of BKPH Sambirejo. 1) Ecological adaptation in Pesanggem showed the availability of well water which previously only relied on rainwater, then adjustments to various types of plants, as well as an understanding of prohibitions and sanctions for illegal activities in forest areas; 2) economic adaptation showed an increase in income for Pesanggem from forest land management; 3) social adaptation showed the existence of cooperation between members and other farmer groups within the LMDH forum. The second finding is that the public's perception in interpreting forest management which contain 5 values, namely the values of wisdom, independence, religion, creativity and healthy living. Based on the study results, the author recommends that forest area communities be involved in managing and guarding forests for generational sustainability, and Perum Perhutani should invite partners from surrounding school institutions as a means of educating generations in joint forest management.

**Keywords:** ethnoecology, forestry community, adaptation pattern

## INTRODUCTION

One of the Perhutani areas is administratively located in the Grobogan Regency, Central Java, which has an area of around 30,049.42 Ha. This area is managed by Perum Perhutani Kesatuan Pemangkuan Hutan (KPH) Purwodadi which is one of the management units in the Central Java Regional Division area (Khaerudin, 2022). Even though the forest in Grobogan is quite extensive, this area has hydrological problems where droughts often occur every year. Previous study shows that Grobogan Regency has a high drought index value of 24.01% (Supangat et al., 2022). This is because the geological condition is rocky/karst, so that when rainfall is high, the potential for water overflow will be lost during the evapotranspiration process (Meng et al., 2023). As a result, water is difficult to store and be available in the soil layers.

Apart from hydrological problems, in forest management, there are certainly many individuals who use forests excessively and destroy forests. This is an issue that requires attention because current global environmental conditions are increasingly worrying. The trigger is none other than human activity which exploits natural resources and the environment without limits. Especially in activities using forest areas

illegally, logging, transporting, and selling wood without permission from local authorities, even exploiting minerals in forest areas without permission, and removing, bringing and transporting protected plants and wild animals from the forest area without permission from officials in charge of forest areas, which includes forest destruction activities (Putri & Subekti, 2022).

Forestry area communities in fulfilling their daily needs are also inseparable from the use of resources in the forest (Peters, 2015). However, they are not aware that the behavior of those who use the environment causes damage due to excessive use of forests (Fatimatuzzahro & Indawati, 2023). The relationship between humans and the environment is not something new in academic studies, but existing environmental phenomena increasingly need special attention because environmental conditions can change with the times (Triyanti et al., 2023). There are more and more phenomena of environmental management and utilization that do not pay attention to cultural systems. This reminds us of the position of humans as caliphs on earth, who should have duties and responsibilities in protecting, utilizing, and preserving the environment through wise and correct environmental management.

Humans and the environment are a chain of relationships that cannot be separated. Humans must see the environment as an integrated part of their lives, they must also understand and even interact with the environment to lead to harmonious relationships and equal position in viewing the environment (Sulaeman, 2016). The human position is in one sphere and has a relationship with the environment that is able to form harmony in its interactions.

Humans utilizing the forest is an illustration of human interaction and adaptation with their environment which develops culture. Cultural development appears in natural environmental phenomena, the social environment, and all of these phenomena that can be seen from a historical perspective (Hilmanto, 2010). Then, the analysis of this phenomenon is studied in Julian Haynes Steward's cultural ecology theory, which explains that cultural ecology is a science that studies human adaptation in adapting to certain environments. This results in the concept of ethnoecology which aims to describe cultural adaptation (cultural behavior) by formulating "what a person must know in order to respond culturally appropriately in a socio-ecological context" (Nurhayati et al., 2017).

Steward (1955) has developed a method of analysis called "cultural ecology", namely "environment" and "culture" which then tries to see how as a whole they are interconnected and influence each other (Hilmanto, 2010). Steward stated that cultural ecology is understood in terms of the main cultural features that are analyzed empirically for environmental use, where the livelihood process is influenced by ways determined by the culture of the local community (Efriani, 2020). This can be interpreted to mean that cultural ecology understands the environment as inseparable from culture, culture and the environment are in a unity that influences each other. One of the interactions between the environment and society, according to cultural ecology theory, is to produce patterns of societal adaptation.

Community adaptation patterns in Environmental management is a pattern of community action in producing resources using the technology they have. Hilmanto revealed that society's adaptation patterns basically originate from the need and desire to create harmony between themselves and the environment around them. Apart from that, society influences its environment and society is influenced by its environment, because under certain conditions society is forced to adapt as an effort to meet its living needs with the limitations of the environment around it (Hilmanto, 2010).

Community adaptation is an action or process of adjusting oneself to the environment and surrounding circumstances (Wijayanti et al., 2022). These actions take the form of innovative action patterns, efforts to overcome and find solutions to the problems faced, the process of learning from existing situations, and/or adapting behavior to the realities of society.

The pattern of community adaptation in environmental management is an action and effort carried out by the community to realize sustainable development with an environmental perspective in the context of sustainable development. This cannot be separated from the cultural system that results from the community's adaptation patterns. According to Steward's cultural ecology theory, this cultural system is a value system, belief system, and religious system (Kristiawan, 2017). This means that the production process in managing natural resources (including forest) must pay attention to the cultural system that grows and develops in society.

This cultural system produces different points of view or perceptions for each individual in society. So, there needs to be a study of public perceptions in interpreting environmental management. Perception is generally defined as the way society or a person views an object, be it a physical or social object. Perception is a process of making judgments or building impressions regarding various things contained in a person's senses (Isdianto & Luthfi, 2020). The value system, belief system and religious system from cultural ecology theory are the result of society's ideas, perspective, thoughts and knowledge in its adaptation to the environment which then become society's guidelines in managing the environment. So that perceptions emerge in the meaning of ecological, economic and social adaptation.

Furthermore, this cultural ecology theory is part of the concept of ethnoecology which later gave birth to the ethnoecological approach as a way or method of studying human and environmental interactions as well as cultural results that emerge in society (Sari et al., 2020). This ethnoecological approach then leads to the study of ethnoecology by referring to the theory of cultural ecology put forward by Steward, explaining that there are three procedures in studying cultural ecology as a basic theory of ethnoecological studies, in the form of: (1) the relationship between technology and production or exploitation of resources and the environment. This relates to the use of technology in natural resource production activities to meet needs; (2) patterns of community action in exploiting and producing resources using the technology they have; and (3) value systems, belief systems, and religious systems. This means that the production process in managing natural resources must pay attention to the cultural system that grows and develops in society (Kristiawan, 2017).

Ethnoecological studies which are based on cultural ecology theory aim to understand the relationship between technology and production on environmental management, patterns of community adaptation in environmental management, as well as trying to understand the community's point of view or perception in interpreting environmental management in accordance with existing cultural systems (value systems, beliefs, and religion). Therefore, this study focuses on community adaptation patterns in managing forest and community perceptions in interpreting the management of forest as the element of environment.

## **METHODS**

This study was conducted in the community of the Perum Perhutani area of Grobogan Regency, Central Java Province. The communities studied were Pesanggem who live and work on forest land in the KPH Sambirejo area, especially in Gedangan Village, Wirosari District, Grobogan Regency. Gedangan Village is astronomically located between 111° 2' E – 111° 6' E and 7° S – 7° 6' S, while administratively it borders the following villages: to the north are Komodohbatur Village and Dokoro Village; to the south are Sambirejo Village, Tanjungrejo Village, and Kunden Village; to the west is Tawangharjo District; and to the east is Tambakselo Village. The study site can be seen in Fig. 1, the following study site map.

The informants for this study include key informants, main informants, and supporting informants (Sugiyono, 2015). The selection of informants used purposive sampling according to the criteria of the Pesanggem who were members of PHBM in Sambirejo. The key informant is an employee of the Sambirejo BKPH (Forest Management Unit), who directs and provides keys to search for research data to village communities that manage forest owned by Perhutani. The key informan explained that, there were three people who took part in managing the forest or who joined PHBM (Forest Conservation Through Management Forest Together with the Community) at BKPH Sambirejo. The people who manage the forest are called Pesanggem. There were three Pesanggems (A, B, and C) as the main informants who provided research data related to community adaptation patterns and who provided perspectives on the meaning of forest management (Efriani, 2020). As for supporting informants to provide data to support the research in more detail, the author requested data from the head of BKPH and the Pesanggem family. Data collection was carried out through interviews, observation and documentation. The collected data was analyzed using an interactive analysis process according to Miles and Huberman (Moleong, 2016), which include data reduction, presenting research data, and drawing conclusions according to the study objectives.

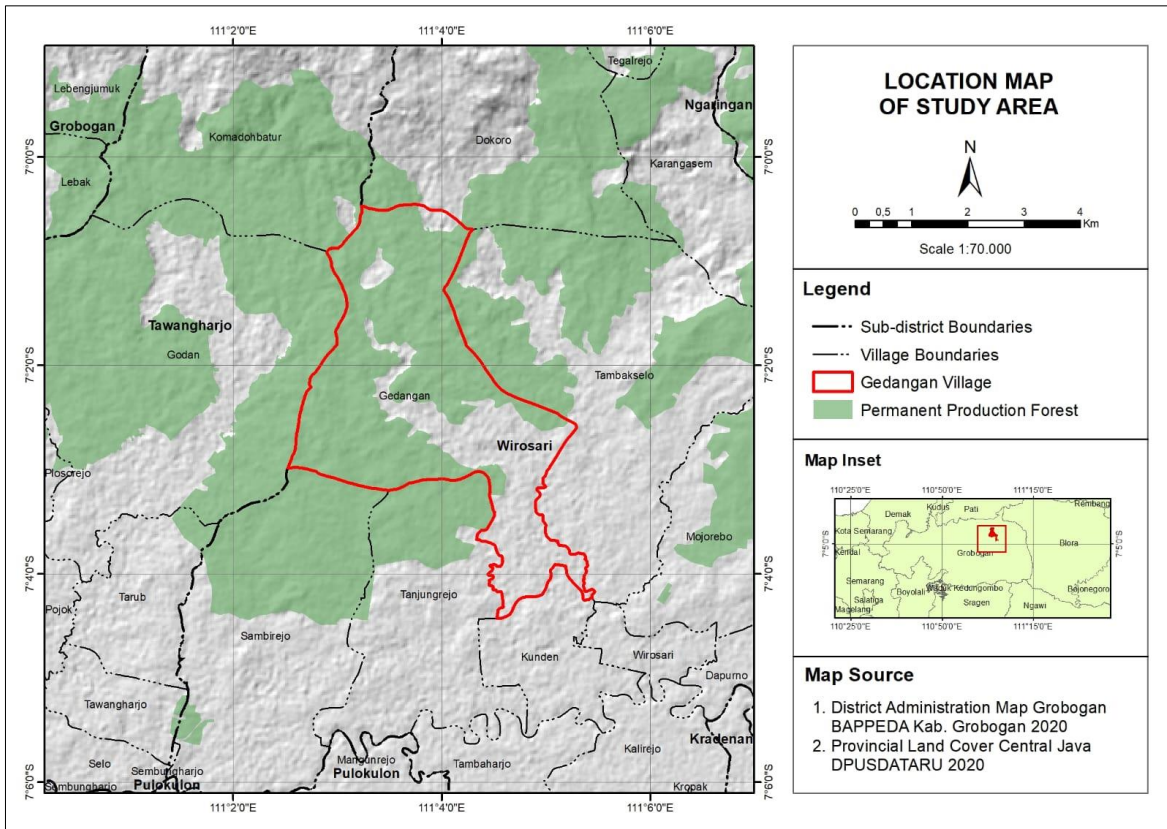


Figure 1: Map of study site

## RESULTS

### Adaptation Patterns of Perhutani Area Communities in Managing the Forest

The pattern of community adaptation that we want to see in this study includes three aspects, namely ecological adaptation, economic adaptation and social adaptation in the Pesanggem community in Gedangan Village, Wirosari District under the auspices of BKPH Sambirejo. The adaptation pattern of these three aspects was investigated by knowing Pesanggem activities in forest management based on several indicators before and after the presence of the PHBM program, on Pesanggem land covering an area of 5,000 square meters. The variables and indicators used to view Pesanggem adaptation are described in the here.

#### a. Ecological adaptation

The granting of forest management permits in the Gedangan Village area is fully granted by BPKH Sambirejo through the Wana Makmur Forest Village Community Institution (LMDH). The area of forest land that is the Pesanggem area is 2,500 square meters managed by Pesanggem A; 1,250 square meters managed by Pesanggem B; and 1,250 square meters managed by Pesanggem C. The activities of this Pesanggem before the existence of PHBM were farmers and casual workers, after the existence of PHBM, some of their work activities became Pesanggem. However, the regulations set by Perhutani regarding limited forest utilization and during the dry season mean that Pesanggem cannot maximize its utilization of the forest under its management rights (Fig. 2).



**Figure 2.** Pesanggem land cannot be planted due to long dry season

This forces Pesanggem to make ecological adaptations to the managed forest in order to continue to meet life's needs. The detailed ecological adaptations are presented below.

**Table 1.** Ecological adaptation of Pesanggem in Gedangan Village

Indicator	Before There was PHBM	After the PHBM
Water Availability	- Rely on rainwater	- Using Rainwater and Wells
Plants used	- Teak tree	- Teak tree - Eucalyptus - Corn - Palawija
Forest Protection and Security	- Illegal Felling of Trees - Timber Theft	- Understanding the rules for not carrying out illegal logging - Imposing sanctions

The presence of PHBM directly reconstructs the community's relationship with forest areas, so that the community has access to involvement in utilization, management, conservation, and even forest guarding. So, this PHBM is able to provide ecological benefits for community adjustment to the forest. This can be seen from the availability of water, which previously still relied on rain. With this program, Pesanggem can irrigate its land with water sources from wells (Fig. 3).



**Figure 3.** Availability of water from wells

The plants used are also more diverse, namely a combination of forestry plants in the form of teak and eucalyptus trees, as well as corn and secondary crops. This varied type of plant with a rotational planting pattern (crop rotation) is managed by Pesanggem to adapt to the seasons (rainy and dry), and is able to maintain and maintain soil fertility and can even minimize forest erosion (Estiyantara, 2022) (Fig. 4).



**Figure 4.** Pesanggem land planted with teak and eucalyptus trees

PHBM through LMDH Wana Makmur has also provided education to Pesanggemes in forest protection and security, in the form of rules not to carry out illegal logging activities and providing sanctions for illegal logging individuals. This certainly provides awareness for Pesanggem and the community in general to involve themselves in sustainable forest protection. This also happened in PHBM under the auspices of KPH Cianjur, that the people who lived in villages around the forest before there was PHBM, did not protect the forest but instead destroyed the forest by looting land and taking wood freely, but after the implementation of the PHBM program, territorial conflicts occurred in forests can be minimized (Situmorang & Noviana, 2022).

#### b. Economic adaptation

The Joint Community Forest Management (PHBM) Program under the management of Perum Perhutani has provided new employment activities and opportunities for the welfare of the surrounding community. The reason is, Pesanggem has received management rights over forest land which can be used to plant teak trees or secondary crops, then there is a sharing system (profit sharing) determined by Perhutani which provides additional income for Pesanggem from the harvest, which is around Rp. 100,000 – 200,000 per harvest. The increase in income can also be seen from communities around the forest in the KPH Cianjur area, they get additional income after joining LMDH in forest management (Situmorang & Noviana, 2022). Detailed economic adaptation is presented below (Table 2).

The livelihoods of forest area communities after the existence of PHBM have certainly changed, not only as private rice farmers or farm laborers but also having additional livelihoods from guesthouse land. This of course has an impact on Pesanggem income which increases from harvest results from the use of managed forest land. Moreover, implementing a rotational planting pattern is also expected to increase the productivity of Pesanggem land, as an effort to gain agricultural profits. It is proven from the Pesanggem narrative that the income received each month can reach Rp. 1,000,000 which was originally only Rp. 500,000. Apart from that, community empowerment from LMDH and farmer groups also provides economic benefits for the development of forest land agriculture.

**Table 2.** Economic adaptation of Pesanggem in Gedangan Village

<b>Indicator</b>	<b>Before There was PHBM</b>	<b>After the PHBM</b>
Livelihood	- Agriculture only relies on rice and secondary crops in private rice fields	- Pesanggem land becomes additional income
Sources of Community Income	- The only source of income is from selling private rice harvests	- Sale of harvests from Pesanggem land
Community empowerment	- There is no community empowerment	- Empowerment through LMDH and Farmer Groups

c. Social adaptation

Pesanggem which manages forests in the BKPH Sambirejo area is a member of LMDH Wana Makmur who lives in Gedangan Village. The existence of LMDH which coordinates Pesanggem provides understanding regarding the wise use and management of forest land, as well as fostering family relationships between fellow Pesanggem and other farmer groups. This creates social adaptation for Pesanggem regarding values, norms and regulations in forest management and utilization. Then you can form good relationships between members of farmer groups as well as partners and stakeholders in realizing a joint PHBM program. In detail, social adaptation can be seen in the following table (Table 3).

**Table 3.** Social adaptation of Pesanggem in Gedangan Village

<b>Indicator</b>	<b>Before There was PHBM</b>	<b>After the PHBM</b>
Adjustments to Values, Norms and Customs in Managing Forests	- There is no consideration of the importance of the existence of forests for all their functions (protection and conservation functions) - Formal rules regarding forest management and utilization are only known	- Consideration of the protection and conservation function of forests has become the basis for forest management and utilization - Apart from compliance with formal rules for forest management and utilization, there is also an understanding of values and binding sanctions for each member
Knowledge of Forest Area Management	- There is no socialization of forest area management	- Forest management and utilization is based on considering the production function of the forest with attention to its sustainability
Collaboration and Networking	- There is no cooperation and network built	- Collaboration with various parties (BKPH, LMDH, and Forest Police)

Related adjustment towards values, norms and habits in managing forests, the existence of PHBM and LMDH drives the function of forest protection and conservation as a basis for forest management and utilization. This has made the community aware of the formal rules for forest management and utilization, as well as the existence of an understanding of values and binding sanctions against forest management regulations, so that patterns of forest management activities take into account the importance of sustainability. Including Pesanggem knowledge on forest management and utilization activities in the rainy season to prevent erosion and landslides, as well as activities in the dry season to prevent drought. Social adaptation of Pesanggem also occurred after the existence of PHBM, namely cooperation between Pesanggem and BKPH, LMDH, and forest police to create a forest care community with joint forest utilization, management, security and guarding programs. Wijayanti in her study also stated that forest management institutions together with the community have opened meeting rooms and a culture of discussion between members and village communities in every activity that will be carried out (Wijayanti et al., 2022).

## **Community Perceptions in Understanding Management of Perhutani Forest Area**

The community adaptation pattern in Gedangan Village, Wirosari District, Grobogan Regency is a form of Pesanggem adjustment in utilizing and managing forests. Therefore, various opinions or perceptions emerge in interpreting forest management as a result of natural phenomena and human adaptation. The public's perception in interpreting forest management refers to ethnoecological values in the form of: the values of wisdom, independence, religion, creativity and healthy living. These values act as intermediaries in creating a society that cares about the forest. The results of study on the perception of Pesanggem in interpreting the management of forest areas are as follows.

### **a. Community perception based on wisdom values**

Pesanggem in forest management is based on the value of wisdom through planting, caring for and harvesting activities. These activities are carried out based on the rights and obligations for Pesanggem determined by Perhutani through LMDH. LMDH also provides education to Pesanggem and other farmer groups about managing forest land wisely, so that Pesanggem gain a lot of knowledge about planting, caring for and harvesting techniques on Pesanggem land. Knowledge and experience in farming are important to obtain product quality and develop crop management (Efriani, 2020). Pesanggem stated that planting, caring for and harvesting activities were carried out according to existing procedures, so that they did not exceed the established limits. This means that the Pesanggem in utilizing the Pesanggem land has carried out procedures and has not violated the rules.

### **b. Community perception based on the value of independence**

The perception of Pesanggem in managing the forest based on the value of independence is to use Pesanggem land according to needs and not violate the rules. Pesanggem also buys its own seeds to plant, without any help from Perhutani. This is a form of Pesanggem independence in its involvement in managing forests. As stated in Article 70 paragraph (3) of the 2009 Law on Environmental Management and Conservation, the aim of community participation is to increase independence, community empowerment and partnership (Kewengian, 2019). According to Pesanggem's statement, Perhutani has issued a rule that when managing Pesanggem land, it must not disturb the trees planted by Perhutani. Therefore, Pesanggem is of the opinion that forest management must refer to existing regulations so as not to, namely focus only on utilizing the land it manages so as not to damage forestry land.

### **c. Perception society based on religious/religious values**

Pesanggem informed that there is a land clearing ritual in clearing the Pesanggem land when it is to be planted, namely by bringing market snacks and ingkung which are brought to the Pesanggem land, then reading prayers. This is done as a form of gratitude to God Almighty and a hope that when planting forest land you will get safety and abundant results. Wright believes that rituals play an important role in creating a harmonious relationship with nature. Ritual practices are an inseparable part of bridging the relationship between beliefs and the physical environment, as well as an effort to glorify and maintain the balance of nature or forests (Gorda & Wardani, 2020).

### **d. Public perception based on creative values**

Community perception is based on the creative value of implementing rotational planting patterns or crop rotation. The crop rotation pattern is expected to maintain soil fertility, form reforestation, and prevent landslides when it rains. Apart from that, crop rotation is also adjusted to the season, for example in the dry season planting crops or corn, while during the rainy season teak or eucalyptus trees are planted. According to Alfiyanti's study, this creative value will improve people's welfare because of the creativity of the production process which produces quality products (Alfiyanti & Lestari, 2022).

### **e. Community perception based on the value of healthy living**

Pesanggem is of the opinion that forest management through the use of Pesanggem land is one of them for preserving the forest that adheres to the principles of sustainability. In essence, Pesanggem land that is managed by paying attention to good planting techniques, namely by planting, caring for and harvesting



plants wisely, will protect the forest so that it can benefit the welfare of the surrounding community for future generations. Slowly, public awareness is starting to emerge that forest-management sustainability is actually the key to achieving all other development goals. Social institutions emerged to revise the meaning of sustainability and build capacity to balance development growth with forest conservation (Gorda & Wardani, 2020).

## **DISCUSSION**

In connection with forest management, Perhutani established Perhutani Public Company Directors' Decree Number 682/KPTS/DIR/2009 concerning Joint Community Forest Management (PHBM) as a management system that focuses on collaboration and synergy between Perhutani and forest village communities. To make this happen, the Forest Village Community Institution (LMDH) was formed through the application of partnership principles which can control community relations with forests through social, cultural, economic and political conditions (Anggiani & Hikmawan, 2022).

The implementation of LMDH involves various parties, such as all daily administrators and members of LMDH, Regional Government (village to Regency/City), related services or agencies, groups that are concerned with institutional development (NGOs, universities, investors), as well as facilitators selected from internal to society or outside society (Situmorang & Noviana, 2022).

KPH Purwodadi working area in managing forest resources in Regency Grobogan Territorially is divided into eight Forest Management Unit Divisions (BKPH), one of which is BKPH Sambirejo. BKPH Sambirejo, which has an office in Sambirejo Village, Wirosari District, Grobogan Regency, under the management of Perum Perhutani has implemented the Joint Community Forest Management (PHBM) program. The PHBM program seeks to prevent and control forest destruction as a form of forest conservation. Therefore, Perum Perhutani through PHBM invites the community to participate in managing and preserving forest resources with a spirit of sharing between the community and Perum Perhutani.

PHBM aims to embrace and partner with communities around the forest so that they can jointly manage the forest with a spirit of sharing, whether sharing roles, land or place use, or the benefits of forest products with the community, namely with a system of sharing (profit sharing) obtained by the community as compensation for involvement in implementing PHBM. The implementation of the PHBM program at BKPH Sambirejo shows that there is community participation and involvement in land-based and non-land-based activities. This has an impact on reducing empty land because the community is involved and willing to be involved in managing the forest. Community involvement in managing vacant land is also a form of reforestation, so that the level of damage and theft of wood in the forest decreases because the community is also involved in maintaining forest security.

The Joint Community Forest Management (PHBM) Program managed by Perum Perhutani has provided changes in the activities of forest area communities, especially in communities around the Sambirejo Forest Management Unit Agency (BKPH), Grobogan. Due to the livelihoods of forest area communities who were previously mostly farmers and casual workers, the CBFM program is able to open up opportunities for new work activities as cultivators of forest land. Cultivator of forest land is then called Pesanggem. Pesanggem, which is under the guidance and supervision of the Sambirejo Forest Management Unit Agency (BKPH), has its work activities involved in forest management, maintenance and supervision.

In carrying out the PHBM program, Perum Perhutani also formed the Forest Village Community Institution (LMDH) as a forum for coordinating Pesanggem which utilizes Perum Perhutani's land. LMDH's role here is to provide education to its members in using forests wisely and provide direction in their involvement in forest maintenance. LMDH is also tasked with providing forest utilization and management permits for communities who have registered as Pesanggem. People register themselves using identity cards in the form of Resident Identity Cards (KTP) and Family Cards (KK).

Pesanggem in managing forest land has a utilization permit with a period of around 2 to 3 years. If Perhutani's plants have started to grow to a height of 1 to 2 meters, then Pesanggem is no longer allowed to use that land. So, it can be said that Pesanggem lost land. This will create a new adaptation pattern for forest area communities, especially Pesanggem. In utilizing forests, Pesanggem has tried to carry out forest production wisely, but when Perhutani's plants have grown according to the specified limits, Pesanggem must accept the limitations of existing forest use. Likewise, during the dry season, Pesanggem said that the

forest land under his management could not be planted because there was no water source (drought). Indirectly, Pesanggem is forced to adapt or adjust itself as an effort to fulfill its living needs within the existing environmental limitations. In line with the opinion of Konstantinidis, et al. that an important aspect in making good decisions is the ability to adapt to changing options, so that you are successful in adjusting a choice (Konstantinidis et al., 2022).

## CONCLUSIONS

The presence of PHBM is able to reconstruct the community's relationship with forest areas in the use, management, conservation and guarding of forests, thereby providing ecological benefits for community adjustment to the forest. Forest communities also have additional livelihoods from Pesanggem land which has an impact on increasing Pesanggem income. Apart from that, Pesanggem also received education from this program regarding forest protection and security, in the form of rules for not carrying out illegal logging activities and providing sanctions for illegal logging individuals. Therefore, Pesanggem is able to do so adjustment towards values, norms and habits as well as gaining knowledge about the function of forest protection and conservation as a basis for forest management and utilization. This has made people aware of the rules and the existence of an understanding of values and binding sanctions so that the pattern of forest management activities takes into account the importance of sustainability.

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## AUTHOR CONTRIBUTIONS

The forest area communities be involved in managing and guarding forests for generational sustainability, so that the function and benefits of forests can remain sustainable. As an academic study, the author also provides advice to Perum Perhutani to collaborate with partners from surrounding school institutions because the seeds of a generation capable of preserving the sustainability of the forest are in the hands of education.

## CONFLICTS OF INTEREST

The authors declare there is no conflict of interest related to financial funding and authorship order for this article.

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