

Ethnoecology Of Local Communities At The Buffer Area Of The Mount Gede Pangrango National Park, West Java, Indonesia

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Abstract

Mount Gede Pangrango National Park area (Taman Nasional Gunung Gede Pangrango or TNGGP) are mountains area in west java that has a high biodiversity. Local communities generally manage its natural resources with an orientation for the benefit of daily life. The current study aimed at identifying local insight/wisdom and socio culture knowledge of people dwell in the surrounding the buffer forest area, particularly Bodogol natural forest area, against preservation of TNGGP. The research method was conducted using community members as informants by means of direct observation in the field and open ended interviews in subvillages closest to the buffer forest area. The data was analyzed using interactive model including components, data collection, data reduction, data presentation and drawing conclusion. The results showed that local communities cultivated three plant species at the Bodogol buffer forest area, furthermore, they recognized their role as part of the social environment and knew how to adapt to the culture involved in that social relationship. This study concluded that the traditional community has local wisdom and high socio-cultural knowledge that supports the National Park preservation programs.

Keywords: natural forest, subvillages, TNGGP, culture knowledge, local communities.

Introduction

Mount Gede Pangrango National Park (Nasional Gunung Gede Pangrango or TNGGP) is one among many other National Parks located in the island of Java. Its management is mostly directed to enable it to protect buffer forests surround it, to preserve flora

and fauna biodiversity and its ecosystem and sustainable utilization of biological resources (Handayani et al., 2015). TNGGP area is bordered or surrounded by residential land, tea plantation, agricultural areas and folk handicraft activities.

This situation causes an interaction between the potential natural resources contained in TNGGP with people who could utilize that available resource to fulfill their needs (Birgantoro & Nurrochmat, 2007). With the above condition, TNGGP is vulnerable to damage or disturbance to the sustainability of the national park forest area. It has been reported that problems often experienced by national park managers are mostly related to communities around the forest (Murniati & Amelia, 2021). In this regard, existence of communities in and around the national park is an integral part of the management of the national park ecosystem, that is an ecosystem formed by the reciprocal relationships between living being and their environment (Comberti et al., 2015).

Rapid population growth around the area, political reformation in 1998 causing communities to use surrounding land more freely creating adverse impacts to rapid destruction of national park forests. Other factor that seem to contribute to the destruction of national park forest areas is socio-cultural factors of the local community, these include low level of education, weak law enforcement, lack of awareness about the environment, and poverty factors in the buffer area (Rusmana et al., 2017).

Indonesia is one of the country which still provide access to the people to manage forest areas (Djafar et al., 2023). A significant portion of the Indonesian population depends on forests for their livelihoods. Notably, 95 out of 217 villages in Ngawi Regency, East Java, are located within or in close proximity to forests, and the majority of the local residents are engaged in farming activities, utilizing forested areas for their agricultural practices. Additionally, Ngawi has a poverty rate of 14.39%, making it one of the most economically challenged regencies in East Java. The prevailing poverty and challenging social conditions in this region could potentially lead communities residing near forest areas and relying on agriculture to be at risk of participating in forest violations (Ragandhi et al., 2021).

Recent forest preservation approach by the Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan/KLHK) when implemented consistently, integrated and sustainable would have a positive impact on future forest conservation. Initially KLHK was centralized and only paid attention to economic aspects, this has been changed with a direction that prioritizes on balances of ecological, economic and social culture of the surrounding community. Forest and land rehabilitation is the Government's strategy in developing people's economic empowerment through local systems, which

at the same time is an effort to save forest sustainability (Moeliono et al., 2009).

Buffer forest area plays a very important role for the preservation of nature reserves and/or nature conservation areas by acting as a buffer in reducing people's pressure towards areas or villages around high interaction areas; and also by combining the interests of conservation and the economy of the surrounding community. This buffer zone function can be optimally achieved by managing the utilization of environment services, economic value and community land conservation through rehabilitation of critical land in community forest or agroforestry systems (Nadhira & Basuni, 2021).

Bodogol natural forest area is one of the natural forest areas located at the foot of Mt. Pangrango in the northwest part of TNGGP (Sadili, 2014), it has an area of 56 hectares and at elevation ranging from 700 to 1500 meters above sea level (Haerida, 2009). Some sub-villages around the forest including Ciwaluh, Lengkong Hilir, Cipeucang and Bodogol. Initiated by the Conservation International Indonesia (CII), TNGGP and Yayasan Alam Mitra Indonesia (ALAMI) in 12 December 1998 this forest area has been inaugurated as the Bodogol Nature Conservation Education Center/Pusat Pendidikan Konservasi Alam Bodogol (PPKAB). The establishment of PPKAB aims to provide education about nature in Indonesia in general, and in particular about tropical forests and animals living inside (Alandana et al., 2015). Three programs are offered at the PPKAB, namely education, research and ecotourism (Pratiwi, 2014).

This ethnobotanic study was aimed to record and documenting the collaboration and interaction between forest area managers and community groups living around buffer forest area and to get a better understanding on the the group's perception on their role as member of a social environment. This documentation would provide a basic knowledge that could be used as a reference for comprehensive development and construction of other National Parks; and as an example to deal with society extractivism. To local communities, the documentation could also serve as a reference for answering live problems that can be multidimensional.

Research Methodology

This ethnobotanical research was carried out at PPKAB, Mount Gede Pangrango National Park, West Java between 2009 to 2011 in several visits, each visit took 7-14 days. Geographically, PPKAB is located between 106°51'30,9" East longitude and 06°46'39,3" South latitude and at an altitude of about 800 – 1000 m above sea level. The topography is undulating, hilly and mountaineous with highly variable slopes ranging from 30 – 40 degrees. Bodogol forest is located in the Districts of Bogor and Sukabumi covering village Benda, Subdistrict Cicurug (District Sukabumi) and village

Watesjaya, Subdistrict Caringin (District Bogor). The forest area is approximately 300 ha and 56 ha is designated as a nature conservation education center which was inaugurated on December 12, 1998. Some subvillages closest to the conservation area include Ciwaluh, Lengkong Hilir, Cipeucang, Bodogol, Ciletuh, Cibilik and Gintung. The local people who live in these subvillages are of predominantly muslim sundanese with their main income being crop and livestock farmers.

This ethnobotanical study used constructivist paradigm as a philosophical basis for understanding reality in society, and a qualitative approach carried out with a case study design. Subvillages Ciwaluh, Cipeucang, Lengkong Hilir dan Bodogol. (Fig. 1) was purposively selected as location for data collection in relation to research activities, utilization and economic evaluation of useful plant diversity in the buffer forest of TNGGP. This selection is based on the proximity of these subvillages to the buffer forest area. Data collection techniques were carried out with a modification of the method of (Le et al., 2008) and Nolan & Turner, (2011) with direct observation in the field and “open ended (semi-structured)” interview; non structural interviews were performed to find out plant species cultivated in the buffer forest area. These interviews were conducted to people in subvillages Ciwaluh, Cipeucang, Lengkong Hilir and Bodogol.

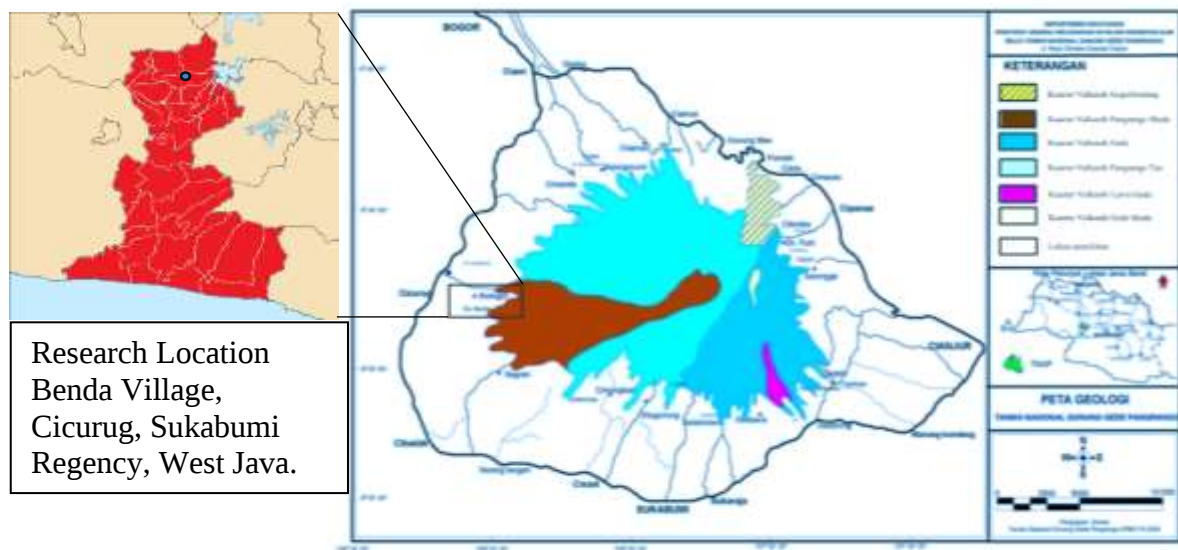


Figure 1. Map of research location, Benda Village, Sukabumi Regency, West Java Province

Data collected were qualitative data that did not consist of numbers but in the form of description and pictures. In addition, qualitative research methods was defined as the process of gaining a better understanding on the complexities in human interaction (Sarwono, 2006). This research focused on data collection of the interaction of local communities at the research

locations, and their perception as well as the social, economic and cultural factors behind it. Data recorded included cultivated plant species, cultivation process, harvesting and post harvest handling also the selling price. The data was analyzed using interactive model including components, data collection, data reduction, data presentation and drawing conclusion.

Results and Discussion

The natural resource management system that has been developed by indigenous peoples and local communities in the buffer zone of national park forests has been going on for a long time. This management system is oriented towards the interests of local communities living in or around the area, and preservation of environmental carrying capacity by developing natural resources management patterns based on decentralization principles, sustainable community participation (Rusmana et al., 2017). As an example, forest resource management carried out by the local community of PPKAB in the TNGGP buffer zone includes agroforestry/wanatani by planting species that have economic value to the local community. The pattern of interaction with the local environment and the farming patterns developed by the local community are quite diverse.

Buffer area is generally created to support conservation/protected area which preserve the environment, it is usually located outside and surround the protected areas and serve to limit human activities so as not to damage the ecosystem in the area. The function of the buffer zone can be materialized if the management and utilization of the environment, economy and community land conservation can be carried out in a balanced manner. Based on the 1998 Indonesian Government regulation number 68 concerning Nature reserves and Nature conservation areas, buffer zones function to protect Nature reserve and Nature conservation areas from various occurred pressures and disturbances. The buffer zones can be forests state land or land encumbered with rights, which are necessary and able to maintain the integrity of nature reserves and nature conservation areas. Therefore, this buffer zone has a very important function, namely reducing population pressure into conservation areas and natural reserves, providing community economic activities, and is an area that allows for the interaction of sustainable benefits for the community and conservation area (Pantunru & Haryoko, 2015).

Socio-economic characteristics of households in this study include age, livelihoods, farmland owned and types of forest products utilized. This is supported by statement of (Widianingsih et al., 2016) in which the interaction of village communities with forests depends on several factors, including community customs and culture, types of livelihoods, levels of income, levels of education and population growth rates.

The communities in the buffer zone and within the TNGGP area were of sundanese ethnic origin. Sundanese sub-villages areas were where people of sundanese origin reside. Interviews were conducted in four sub-villages with the characteristics presented in Table 1.

Table 1. Identity of Ethnical Sundanese Respondents at Sub-villages around the PPKAB

No	Identity	Subvillages/Percentage (%)				
		Ciwaluh	Cipeucang	Lengkong Hilir	Bodogol	Total
1.	Gender					
	Men	4	5	3	5	17
		23,53%	29,41%	17,65%	29,41%	100%
	Women	3	3	4	5	15
		20%	20%	26,67%	33,33%	100%
2.	Age					
	30-45 years	2	2	2	3	9
		22,2%	22,2%	22,2%	33,3%	100%
	Over 45 years	5	6	5	7	23
		21,74%	26,09%	21,74%	30,43%	100%
3.	Occupation					
	Traditional leader	1	1	1	1	4
		25%	25%	25%	25%	100%
	Farmer	3	4	2	4	13
		23,08%	30,77%	15,38%	30,74%	100%
	Housewife	3	3	4	5	15
		20%	20%	26,67%	33,33%	100%
4.	Education					
	Graduated	6	7	6	8	27
	Elementary school	22,22%	25,93%	22,22%	29,63%	100%
	Graduated Junior	1	1	1	2	5
	high School	20%	20%	20%	40%	100%

Data on respondents in villages around PPKAB

Table 1 showed that 17 persons respondents were male and 15 female, indicating that the community utilizing TNGGP ecosystem service in the form of non-timber forest products (Hasil Hutan Bukan Kayu/HHBK) was not only male but also female. Housewives who did not have a steady income to fulfill their family needs usually entered the forest to collect HHBK and sold the to collectors to earn money. If this condition was allowed to continue, it was worried that the natural resourced in TNGGP would be exploited continuously and could not be sustainable. Therefore it was necessary to regulate and convey an understanding to the community in order to utilize resources wisely and sustainably.

In terms of age of the head of the family, highest precentage, around 72% of the total head of family, was dominated by the age over 45 years, with the remaining age of

30-45 years old contributed to around 28%, This was a clear indication that respondents with a productive age range working to meet their family's daily needs were over 45 years old and in accordance to the statement of Girsang & Efendi, (2006) in which the productive working age in Developing countries were generally between 15-55 years. Age affects a person's ability to benefit from forest products as productive work ability would continue to decline with advancing age. Sub-village of Bodogol dominated work force with 30.43% of work force above 45 years old and 33.3% of work force between 30-45 years, followed by the three other sub-villages.

The occupation of family heads in the four research sub-villages in fulfilling their needs or helping their families was self employed by becoming sharecroppers/ sharefarmers, traditional leaders and housewives. With the highest percentage being sharefarmers, 30.76% at Bodogol and Cipeucang sub-villages followed by housewives, 30.33% at the Bodogol sub-village.

High level of community interaction was dominated by the Bodogol sub-villagers that had lowest education level, ie 29.63% graduated from elementary school. Low education led to low processing of forest and agricultural products by farmers. Most communities directly sold forest products without processing them into more valuable forms due to urgent economic demands. (Sujana, 2017) stated that a person's education could affect his/her creativity in providing services and improving performance in his/her job, thus in this case not many farmers in this area processing forest products into other forms that have more economic value.

The highest level of education was observed at the sub-village of Bodogol, in which 2 head of families were graduated from Junior high school, graduates from Junior high school were also observed at the sub-villages of Civaluh, Cipeucang and Lengkong Hilir. There were many factors that caused villagers or respondents to have a low level of education, including family economy limitations, lack of information about the importance of education, lack of parental and personal awareness to continue to a higher level of education. This condition could make villagers difficult to find a job, as stated by (Nugroho et al., 2008) that low level of education contributed to low skills; furthermore, (Munanura et al., (2014) added that poor quality of education and poor health condition would encourage community living around the forests to depend more on forests.

The data presented in Table 1 showed that the highest education level of head of family observed was Junior high school and that respondents with elementary and secondary education level was evenly distributed across the four sub-villages. Authors would like to emphasize that this condition could have a positive impact in terms of information sharing, ability and experience among the community in terms of skills and technology

development both in the utilization of forest products and their management. To affirm statement of (Birgantoro & Nurrochmat, (2007), that in sub-villages where villagers with a low level of education were mixed with villagers with a higher level of education, a direct or indirect positive results would occur that led to the transfer of knowledge, skills and market information.

From the interview results , it could be explored that various forms of natural resources utilization in PPKAB had generally been going on since before the establishment of the area as a national park buffer zone. The potential of natural resources in the conservation area and buffer zone of TNGGP is quite large. In general, the community had utilized various types of local plants found around TNGGP to fulfil their own needs (subsistence) and to be traded.

Some important natural resource utilization in PPKAB included tapping pine (*Pinus merkusii*) and rasamala (*Altingia excelsa*) sap, cutting trees to meet the need of building materials and firewood, catching wildlife including birds, and collecting forest products including canar (*Smilax leucophylla*) fruit. However due to a ban from the district manager, the above activities had not been possible since around 1995, especially for wildlife catching and cutting down trees for building materials. Meanwhile, the tapping of pine and rasamala sap, as well as the collection of canar fruit had ended since around 2005. Cutting of trees for firework purposes had ended since the government program in the form of natural gas subsidy was introduced around 2007 (Rahayu et al., 2012).

International experience has shown that the changes of long-term sustainable forest management increase when ownership and management of forest resources remain the livelihood rights of local communities. Nepal's community forest management program was considered a success story in reforestation and livelihood improvement. The program had increased the income of rural households and had protected the ecology of forest areas (Pantunru & Haryoko, 2015).

The local community that lived around the PPKAB was of sundanese ethnicity and generally worked as farmer and was homogeneous. From the results of the interview it was known that the management of PPKAB area allowed local communities to use PPKAB land for planting with high-value crops as long as they did not damage the forest. Cutting down existing trees that reduces trees diversity and burning litter from clearing land for planting were catagorized as damaging forest whereas applying organic fertilizers and harvesting cultivated crops manually is considered environmentally friendly, and thus considered improving forest.

The types of plants cultivated with agroforestry system on buffer lands were plants that have economic value to fulfill daily household income. Generally, the PPKAB buffer land utilized

by the community comprised about 1000m² for planting cardamom/kapol (*Wurfbainia compacta* (Sol. ex Maton) Škorničk. & A.D.Poulsen) or robusta coffee (*Coffea canephora* Pierry ex Froehn.) by communities from sub-villages Bodogol, Cipeucang and Ciwaluh, whereas community from sub-village Lengkong Hilir utilized 500m² for planting kumis kucing (*Orthosiphon aristatus* L.). Field observation revealed that kapol and coffee were sometimes cultivated with agroforestry system.

Kumis kucing/cat whisker is a type of plant from the family of Labiatea/Lamiaceae and is used as one of the traditional medicinal ingredients to treat urinary tract infections (Rahayu et al., 2020). Local people around Bodogol drank decoction of its leaves to treat back pain and postpartum cares as herbal medicine (Susiarti et al., 2018). In other parts of Indonesia, for instance in Gunung Halimun National park, the local community used it as herbal medicinal ingredient (Rahayu & Harada, 2004); whereas local community in the area of Mount Ceremai National Park used it as antipyretic drug (Herlina et al., 2019).

The first harvesting of kumis kucing was normally conducted 3 months after planting, twice every month. The yield of leaves from a land area of 500m² was around 70kg wet weight per harvest. Drying of leaves was done under the sun for two days and the ratio of 10kg wet leaves to become 2kg dry leaves. Selling price of dried leaves was IDR 5000 per kg. With this type of agroforestry, farmers could obtain an additional income of up to IDR 200.000 per month.

There are three species of stimulant from the genus *Coffea*, namely *Coffea canephora* Pierry ex Froehn., *C. arabica* L. dan *C. liberica* Bull. Ex Hiern (Van Der Vossen et al., 2000). Local people of Bobolio village, at the island of Wawonii, southeast Sulawesi utilized coffee not only as drink but also used it as a traditional medicinal ingredient as stimulant of labor (Rahayu & Rugayah, 2007). It seemed that this knowledge was not well known to the ethnic sundanese who lived in the vicinity of PPKAB. The form of interaction in the utilization of forest products around TNGGP by local communities was by planting robusta coffee type or *Coffea canephora* Pierry ex Froehn in PPKAB area. Coffee planting was conducted without intercropping with kapol in an area of 1000m² with 100 plants. First harvesting was done after 3 years of planting, and only once a year. Each tree produced at least 3 kg of wet coffee beans. Ten kilograms of wet coffee bean after sun-drying for 5 days become 2 kg of dried coffee beans. Wet beans were sold at IDR 1.200/kg while dried beans at IDR 8.000/kg. The results of interview with farmers found that additional income from coffee farming could attain up to IDR 3.000.000 each harvest.

Cardamom or kapol/kapulaga is a type of plant from the family of Zingiberaceae and genus of *Amomum*; it is generally used as a spice as well as traditional medicine (Silalahi, 2017), people

around the PPKAB area used it as one of ingredients for postpartum care (Susiarti et al., 2018). Cardamon is one of the native or endemic plants of Indonesia, its cultivation is spread across 20 provinces and the largest is in West Java. Bodogol sub-villagers utilized 1000m² of the buffer forest land to plant 100 cardamon. First harvest was conducted after one year planting, and could be harvested throughout the year or every month with the yield of 40kg of cardamon seed each harvest. The seed could be further sun-dried for 7-10 days to obtain dried cardamon seed, 10kg of wet seed yielded 2kg of dried seed. Selling price of wet seed was IDR 5.000 per Kg, IDR 35.000 per kg dried seed, and IDR 3.000 per kg for young/immature seed.



(a)

(b)

(c)

Figure 2. Plant species cultivated by local communities living in the buffer zone around PPKAB (a. Cardamom or Kapol/Kapolaga, *Wurfbainia compacta* (Sol. ex Maton) Škorničk. & A.D.Poulsen, b. Kumis kucing, *Orthosiphon aristatus* (Blume) Miq, c. Coffee, Kopi, *Coffea canephora* Pierre ex A.Froehner)

It was noted from the results of interviews with respondents that the sale of kumis kucing and cardamom was managed by a cooperative formed by the PPKAB managers. Coffee sale was excluded from the cooperative due to its lacking the desired quality, in other word, coffee from this area lost competition with coffee from other regions. It was also noted that respondents and their sub-village colleagues preferred to cultivate kumis kucing and cardamom compared to coffee cultivation. Despite this, coffee cultivation was still practiced on the grounds that it was easier to maintain.

Conclusion

This study noted an awareness from the communities in their interaction with forest and the surrounding environment at buffer forest zone of TNGGP; also noted was a good cooperation between forest area managers and the local communities surrounding PPKAB. Levels of interaction of Bodogol and three other sub-villagers with forest buffer zone of TNGGP was

considered dominantly high. Three species, namely kumis kucing (*Orthosiphon aristatus*), cardamom/kapol (*Wurfbainia compacta*) and robusta coffee (*Coffea canephora*) were rcultivated inside buffer forest zone of TNGGP; the agroforestry system practiced by local villagers increased their income. Indirectly, these activities reduced extractivism so that the national park forests could maintain their ecosystem and biodiversity. This documentation would provide a basic knowledge that could be used as a reference for comprehensive development and construction of other National Parks; and as an example to national parks managers to deal with society extractivism. To local communities, the documentation could also serve as a reference for answering live problems that can be multidimensional.

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