Mangrove *Kaboa* (*Aegiceras corniculatum*): The Correlation Study of Indigenous People's Knowledge to Ethnoconservation at Sancang Garut Beach

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ABSTRACT

Kaboa (*Aegiceras corniculatum*) is a type of mangrove known as a typical plant in the Sancang Beach area because of its legends and myths. Currently, the number of *Kaboa* plants on Sancang Beach is decreasing. One of the causes can occur due to human interference, disturbances to the habitat or exploitation of these plants. The reduction of such species can be avoided by knowing the extent of people's knowledge of the *Kaboa* plant (*Aegiceras corniculatum*) and the ethnoconservation attitudes carried out. This study used quantitative methods with a correlational approach. It was conducted in Sancang Village, Sagara Village, Karyasari Village, and Karyamukti Village, Garut Regency with a research instrument in the form of a questionnaire given to 100 respondents from the four villages. The results showed that local people's knowledge of *Kaboa* plants was in the good category with an average value of 77.48/100 while the ethnoconservation attitude of the community towards *Kaboa* plants was in the partial category with an average value of 82.13. The value of the relationship between local community knowledge and ethnoconservation attitudes towards the *Kaboa* plant is 0.620, which indicates that there is a strong and unidirectional significant relationship between indigenous people's knowledge about the *Kaboa* plant (*Aegiceras corniculatum*) and the ethnoconservation attitude carried out. The level of indigenous knowledge that is considered good and the indigenous conservation attitude of the people who are in the category of favoring the *Kaboa* plant must be maintained and even increased so as to provide opportunities to maintain and preserve the *Kaboa* plant in its habitat.

Keywords: Attitude, conservation, *Kaboa* (*Aegiceras Corniculatum*), knowledge Sancang Beach

INTRODUCTION

Leuweung Sancang Nature Reserve holds much potential diversity of flora and fauna. *Leuweung* Sancang Nature Reserve consists of lowland, coastal, and mangrove forests. The existence of mangrove forests is found along the south coast of the *Leuweung* Sancang Nature Reserve. Regarding its usefulness, mangrove forests have essential environmental functions, namely physical, ecological, and economic functions (Indarjani and Wibowo, 2021; Carugati et al., 2018). The existence of mangrove forests can protect coastlines and

coastlines to remain stable against natural disasters such as abrasion and tsunamis (Onyena and Sam, 2020). In addition, the existence of mangrove ecosystems is able to create a global climate through its role in carbon sequestration and storage, providing habitat and breeding grounds for many species, protecting local communities from the dangers of coastal natural disasters, and providing cultural ecosystem services such as ecotourism and educourism (Su et al., 2021). If there is mangrove damage, it will eliminate these functions and will have a bad impact on environmental sustainability.

Sancang Beach has a distinctive type of mangrove and is famous for its legends and myths known as *Kaboa* (*Aegiceras corniculatum*). Although *Kaboa* (*Aegiceras corniculatum*) has a relatively wide distribution in coastal and estuary areas in Asia to southern China, New Guinea and Australia, its presence is influenced by tidal conditions (Mulyaningsih et al., 2021). The factors that make the *Kaboa* unique that grow in the Sancang forest area are affected by historical values and people's trust in these plants. According to people's beliefs, the *Kaboa* tree is a heritage tree of Prabu Siliwangi (Rosyadi, 2013). Meanwhile, Sancang Beach is an area that is legendary as a place for the disappearance of Prabu Siliwangi. The legends found in the Sancang area became an attraction and made the region a spiritual cultural tourist attraction.

Based on the results of the initial observations that have been made, it was found that the opening of *Leuweung* Sancang as a spiritual, cultural tourism site; of course, this has had a good impact on the economy of the people there, but some visitors or pilgrims who come sometimes cut down and take *Kaboa* trees for specific purposes. These attitudes show that people use easy ways to exploit natural resources in the *Leuweung* Sancang Nature Reserve, which are not to be manipulated in any form. This shows that legends that develop in society positively and negatively influence one's attitude (Mintzer et al., 2015). The study about plant uses and indigenous knowledge will bring new concepts about plant conservation (Sulistiyowati et al., 2021), a specific *Kaboa* plant in the *Leuweung* Sancang Nature Reserve. Therefore, a study is needed to determine the level of indigenous knowledge and ethno-conservative attitudes of the surrounding community towards this *Kaboa* plant, ultimately determining the sustainability of the *Kaboa* plant in its natural habitat. Thus, this study aims to assess the extent of public knowledge about the *Kaboa* tree and the conservation attitudes carried out to maintain mangrove biodiversity in Sancang Garut Beach and the relationship between these two factors.

METHODS

Study Area

The study was conducted in four villages around the *Leuweung* Sancang Nature Reserve area, i.e., Sancang Village, Sagara Village, Karyasari Village, and Karyamukti Village (Figure 1). The subject of this study was the kaboa plant located on Sancang Beach. It can be found in the *Leuweung* Sancang Nature Reserve's coastal area, which includes Cibako, Cipalawah, and Cikabodasan (Figure 2). The condition of the people in the four villages is dominated by work as farmers and fishermen. Most people are familiar with the *Leuweung* Sancang Nature Reserve because some of the people who work as farmers and fishermen use the natural resources in the area as a source of livelihood.

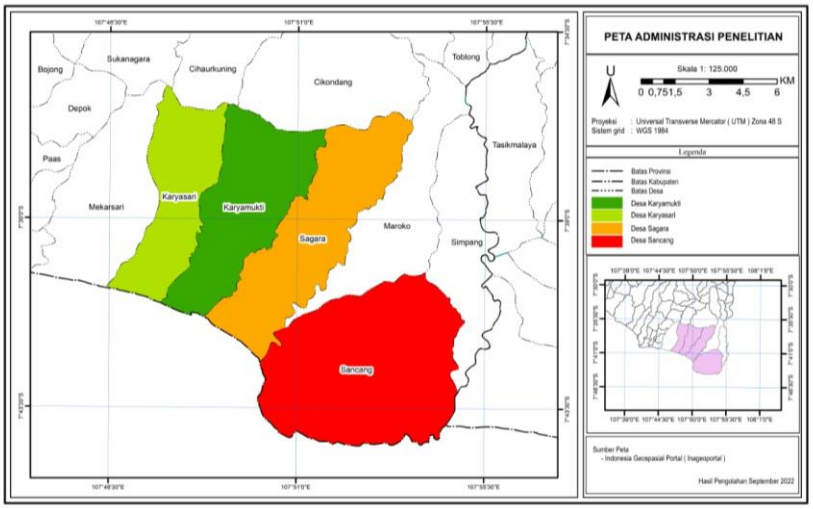

Figure 1. Research locations in Sancang Village, Sagara Village, Karyamukti Village and Karyasari Village, Garut Regency, West Java, Indonesia

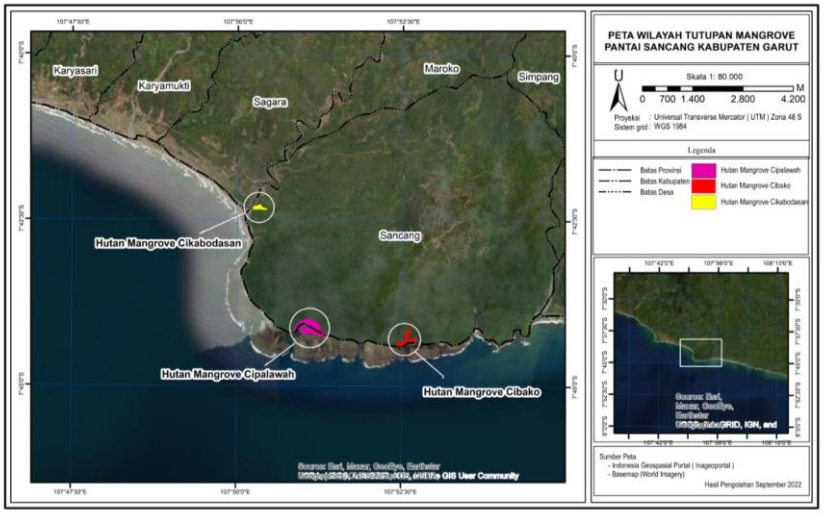

Figure 2. Location of mangroves at Sancang Beach

Data Collection

This study used a quantitative method, with a survey research type using a questionnaire. The sample in this study was selected using a purposive sampling technique, which was used to select respondents who were most likely to produce appropriate and valuable information. Questionnaires were given to respondents in the form of semi-open questions, which were filled in by interviewing the respondent or directly filled in by the respondent concerned (Kelly, 2010; Campbell et al., 2020), which focused on fundamental questions about the informants' knowledge about the uses and importance (Oza et al., 2021) of using the *Kaboa* plant. The sample used was 100 respondents with the criteria of respondents, namely people aged 17-60 years and over and willing to be the subject of the study. The research instrument used a non-test technique in the form of a questionnaire of 30 statements to find out public knowledge by scoring the Thurstone Scale. This scale provides two answer choices where the expert predetermined the statement items used previously (Rosenberg and Silva, 2018).

The measured indicators of knowledge included community knowledge (Munawaroh et al., 2020) regarding the use of the *Kaboa* tree, community knowledge regarding the maintenance of the *Kaboa* tree, and community knowledge regarding the supervision of the Kaboa tree. Meanwhile, ethnoconservation attitudes were measured by scoring a Likert Scale of 30 statements. The scale range used was four answer choices with consideration to eliminating the possibility of biased answers (Chyung et al., 2017), with the indicators measured being sensitivity to biodiversity values, locus of control, personal responsibility and social, and hope and despair. To measure the feasibility of the research instrument, a validity test was carried out by a judgment expert.

In addition to the questionnaire data, data regarding the morphology of the *Kaboa* plant was also collected by observing all aspects of the *Kaboa* plant's morphology, including leaves, stems, flowers, and fruit. *Kaboa* plant samples are documented directly in their natural habitat.

Data Analysis

The prerequisite tests were applied to test the normality and linearity. Data on community knowledge about the *Kaboa* plant (*Aegiceras corniculatum*) and its ethnoconservation attitude is obtained by calculating the scores obtained into values by dividing the average score obtained by each respondent with the maximum score, while the hypothesis test was analyzed using the spearman rank correlation test, this correlation test is used to measure the strength and direction of the relationship between two variables (Perez & Santos, 2022). The test was used to determine the relationship between indigenous people's knowledge of Kaboa plants and ethnoconservation.

RESULTS AND DISCUSSION

The existence of *Kaboa* trees (*Aegiceras corniculatum*) on Sancang Beach can be found growing in groups at the mouth of the Cibako River which is a brackish water area with normal rising tides (Figure 3A). *Kaboa* tree is a type of mangrove in the form of a shrub or small tree, spread in areas with high salinity, has roots that spread above the soil surface with gray or reddish-brown bark (Agarwal et al., 2018) (Figure 3B).

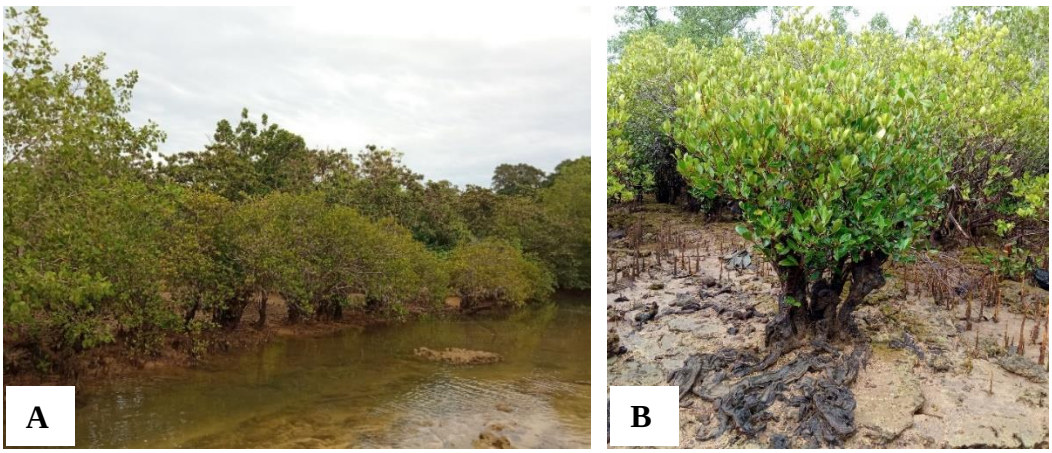

Figure 3. *Kaboa* tree in Sancang Beach. (A) A collection of *Kaboa* trees on the banks of the Cibako river estuary; (B) *Kaboa* trees

Based on the results of direct observations, the *Kaboa* tree has morphological characteristics, namely its roots spread above the soil surface with ash or brown bark and have lenticels (Figure 4A). The lenticel is a gap or hole with a large number and can be found on the surface of the wood (Figure 4B).

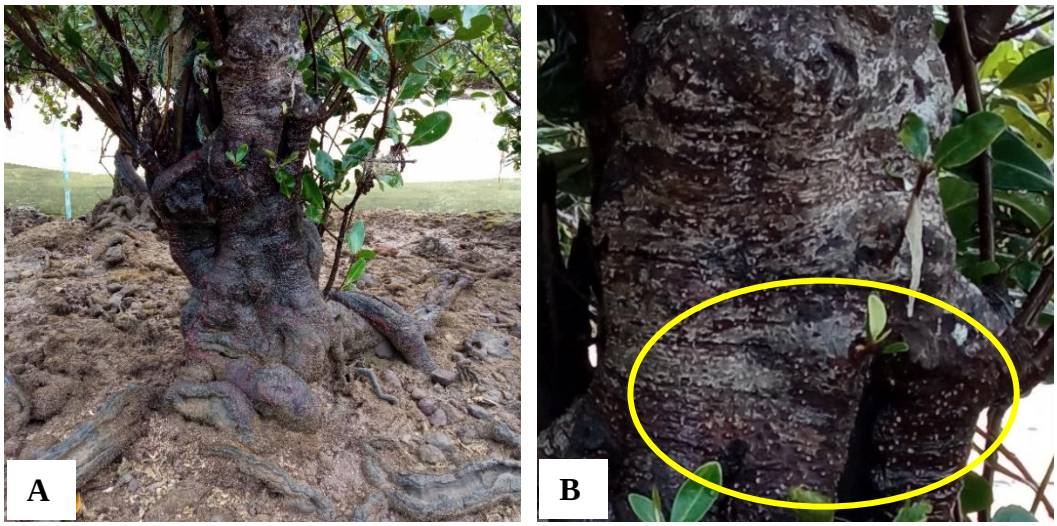

Figure 4. *Kaboa* tree root. (A) Roots and trunks; (B) Lenticels on the bark of trees (yellow circle)

Based on the results of direct observations of leaves on the *Kaboa* tree at the mouth of the Cibako river have a green leaf color with a shiny leaf surface (*glabrous*) and have a pale green color on the bottom, the layout of the leaves is crossed (folia opposita) because there are leaves that are located opposite to each other on each stem book on the same branch, the arrangement of leaves is a single leaf (*folium simplex*) because it consists of only one leaf blade on one petiole, the leaves on the *Kaboa* tree serve to expel excess salt through the salt glands contained in the leaves (Figure 5A). In morphological tones *Kaboa* leaves have breech ovoid leaf build (*obovatus*) with a narrowed leaf base (*acuminatus*), the blunt leaf tip is slightly split showing a slight indentation (*retusus*), the leaf edge is flat (*integer*), has petioles about 3-6 mm long, pinnate leaf blades (*penninervis*), the size is about 10-11 cm with a leaf width of about 4-5 cm (Figure 5B).

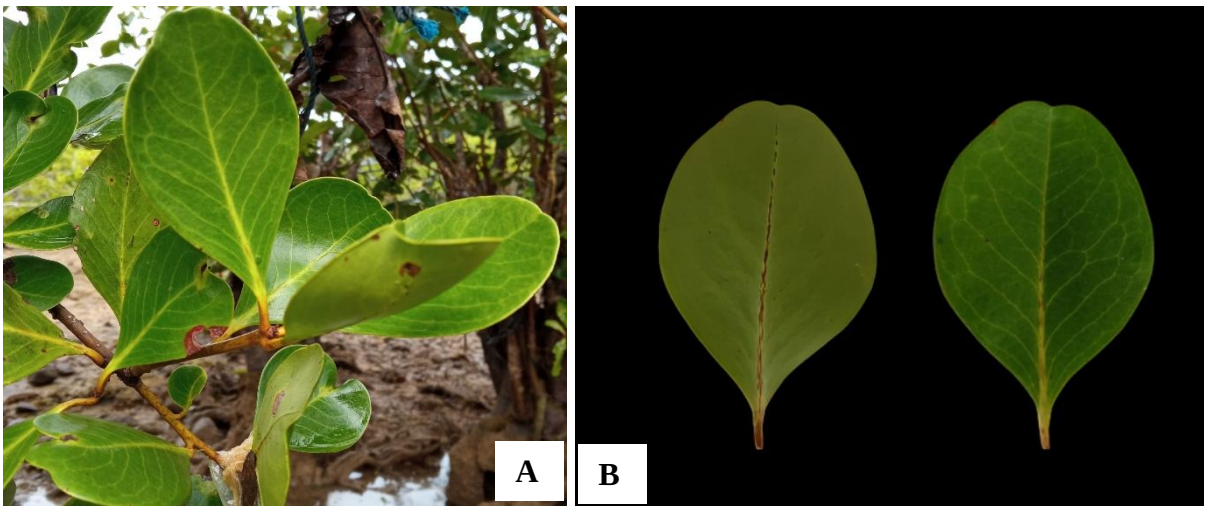

Figure 5. *Kaboa* leaves at the mouth of Cibako River. (A) Result of direct observation of *Kaboa* leaves; (B) Result of identification of *Kaboa* leaf morphology

The observations of *Kaboa* flowers directly show that *Kaboa* has small white flowers that are arranged in one bunch, hanging like an umbrella and located at the end of the stem (*terminal*) (Figure 6A). The size of the flowers is about 1-2 cm long, the flower crown (*corolla*) and petals (*calix*) numbering 5 are white-green and fragrant (Figure 6B), have a pink pistil (*pistillum*) that is above the base of the flower (Figure 6C), and stamens (*stamens*) with stamens (*filamentum*) are white and anthers (*anthers*) are yellow (Figure 6D).

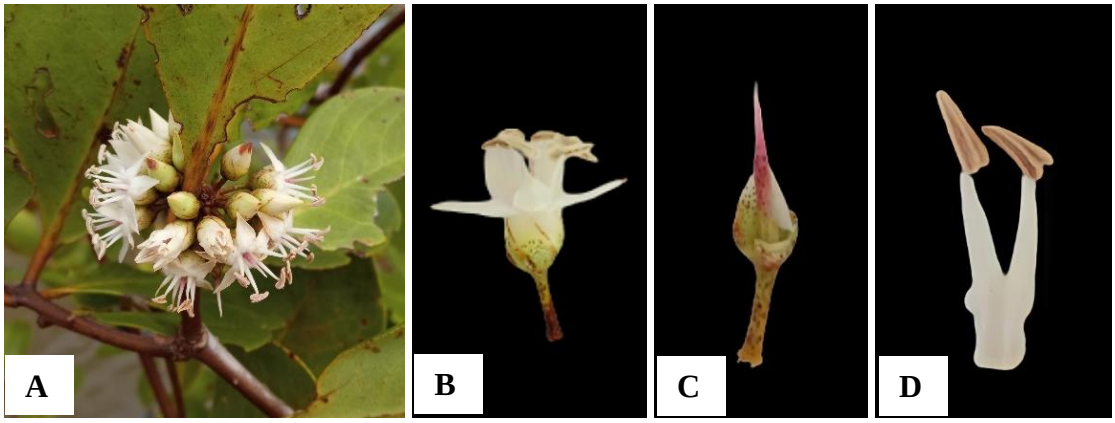

Figure 6. *Kaboa* flowers at the mouth of the Cibako River. (A) Result of direct observation of *Kaboa* flowers; (B) *Kaboa* flowers; (C) Pistils; (D) Stamens

Based on the observations of *Kaboa* fruit directly shows that *Kaboa* has a green fruit, growing at the end of the stem with a tapered tip of the fruit (Figure 7A). *Kaboa* has long fruits shaped like peppers; the length of the fruit is about 4-5 cm with a diameter of about 5-6 mm (Figure 7B). The fruit is not fleshy, has a hard seed coat (Figure 7C), the seeds of the fruit number one hairy with the remains of the placenta attached to the seed coat (Figure 7D). The seed germinates in the fruit but remains inside the fruit until the fruit falls and splits (*cryptovivipary*), the seed contains only a small amount of endosperm (*exalbuminous*) (Das and Ghose, 2003).

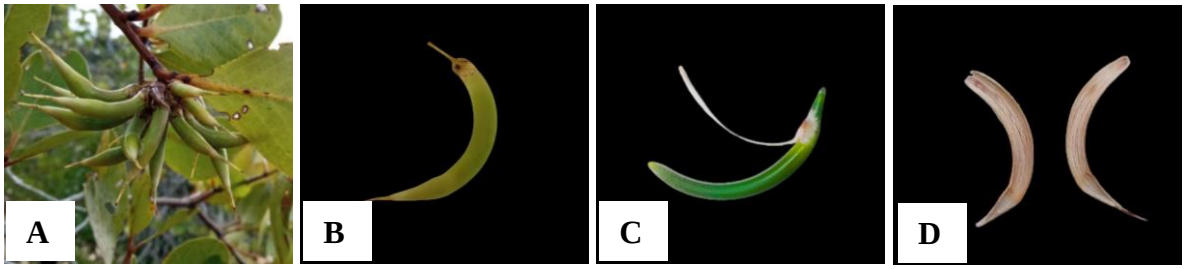

Figure 7. *Kaboa* fruit at the mouth of the Cibako River. (A) Result of direct observation of *Kaboa* fruit; (B) *Kaboa* fruit; (C) Seed; (D) Fruit Skin

The process of fruit formation on the *Kaboa* tree is known through several stages, namely from the emergence of flower buds to becoming prospective flowers, the flowers that have appeared then become flowers ready to bloom, then the petals that have bloomed will fall and fall so that fruit will be formed, young fruits to become ripe *Kaboa* fruits (Figure 8).

Figure 8. Proses of *Kaboa* fruit formation

Based on the results of the monitoring, information was obtained that some people use *Kaboa* tree wood to be used as handicrafts and then traded to visitors who come to the Sancang area. One of the handicrafts from *Kaboa* tree is bracelets (Figure 9A) and sticks (Figure 9B).

Figure 9. Crafts from *Kaboa* trees. (A) Bracelet; (B) Stick

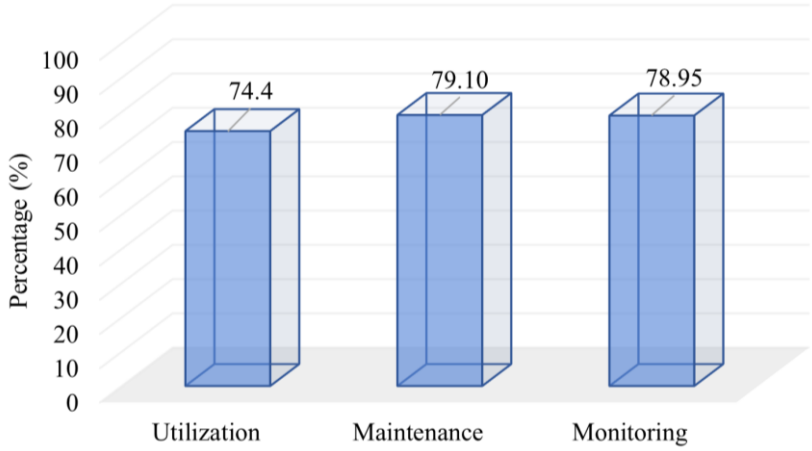

Figure 10. Community knowledge distribution diagram based on knowledge indicators

In the diagram of the distribution of public knowledge based on knowledge indicators (Figure 10) based on the results of filling out a questionnaire from 100 respondents, the highest results of public knowledge were obtained, namely the maintenance indicator of 79.1%, the supervision indicator of 78.95% and the utilization indicator with the smallest value of 74.4%.

In the diagram of the distribution of ethnoconservation attitudes of the community based on attitude indicators (Figure 11) the highest results were obtained, namely the highest community attitudes were in the expectation and despair indicators of 85.25%, sensitivity indicators to biodiversity values of 81.19%, indicators of personal responsibility and social responsibility of 80.92% and locus of control indicators (political action, ecomanagement, persuasion and conservation action) with a value of 80.84%.

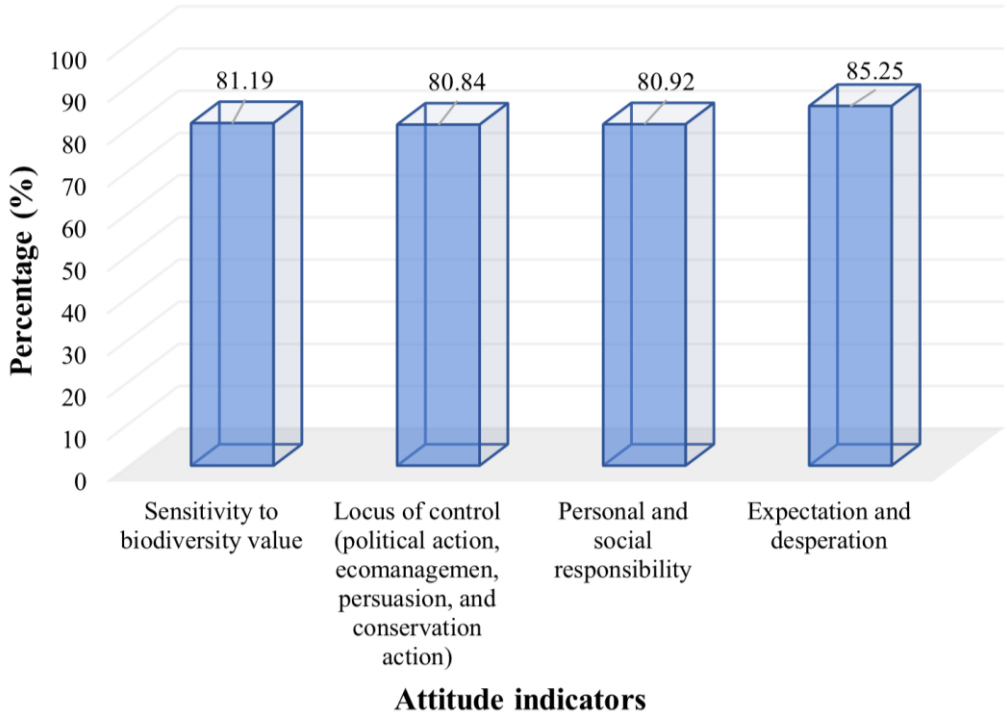

Figure 11. Diagram of the distribution of ethnoconservation attitudes of society based on attitude indicators

The results of the Spearman Rank (Table 1) correlation test obtained a correlation coefficient of 0.620**. That is, the level of strength of the relationship between the variables of indigenous people's knowledge of *Kaboa* plants and the ethnoconservation attitude of the community towards is 0.620 or strong. An asterisk (**) means that the correlation is significantly valued at a significance figure of 0.01. The correlation coefficient analysis is positively valued at 0.620, so the relationship between the two variables is unidirectional. Based on the calculation results, it is known that the significance value or Sig. (2-tailed) is 0.000 < 0.05 or 0.01, meaning that there is a significant relationship between the variables of indigenous people's knowledge about *Kaboa* plants and ethnoconservation attitudes carried out by the community.

Table 1. Spearman Rank Correlation Test Results

			Indigenous people's knowledge of *Kaboa* plants	Ethnocoservational attitude to *Kaboa* plants
Spearman's rho	Indigenous people's knowledge of Kaboa plants	Correlation Coefficient	1.000	.620**
		Sig. (2-tailed)	.	.000
		N	100	100
	Ethnocoservational attitude to *Kaboa* plants	Correlation Coefficient	.620**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

***. Correlation is significant at the 0.01 level (2-tailed).*

Public Knowledge Relations and Ethnocoservation Attitudes

The results of the correlation test using the Spearman Rank correlation test obtained a correlation coefficient value of 0.620, which means that there is a strong and unidirectional significant relationship between indigenous people's knowledge of *Kaboa* plants (*Aegiceras corniculatum*) and ethnoconservation attitudes. This relationship shows that the higher level of public knowledge about *Kaboa* plants, the conservation attitudes carried out by the community will also increase. The results of this study are in line with research conducted by Ernawati et al. (2016) where there is a positive and strong relationship between the perception of local wisdom and the conservation attitudes of the Lencoh village community in Mount Merapi National Park with a value of rxy = 0.678.

Indigenous People's Knowledge

Based on the community knowledge distribution diagram based on knowledge indicators as can be seen in Figure 10, the difference in the level of knowledge of the community that varies can be influenced by several factors, namely gender, profession, and living environment. Moekijat (1998) posits that gender has a direct or indirect involvement in a person's level of knowledge. In this study, the results were obtained that the majority of people who are male as much as 35% have knowledge in a high category compared to women only as much as 30%. Research conducted by Putri (2020) also showed that the results of filling out the questionnaire were seen based on gender, where respondents who were male had a higher knowledge value with an average number of scores of 8.6 results higher than female respondents.

A profession is the work of a person who generates wages from the results of the embodiment of knowledge or specific skills possessed. Based on the results of research on types of professions that are directly related to *Kaboa* plants such as caretakers, fishermen and entrepreneurs who are around the coast have better knowledge, because these professions require them to know the condition of Sancang Beach and all the things in it. This is in line with the opinion of Widawati et al. (2017) posits that one's understanding will emerge when one interacts with others or one's environment through work. The results of the study

conducted by Prayoga et al. (2022) also shows that work affects the level of knowledge of the community.

A residential environment is an area occupied by a person to live and interact with living things around him. The living environment affects a person's knowledge. In line with the opinion expressed by Darsini et al. (2019) that the environment has an influence on the process of entry of knowledge into an individual. In the results of this study, the results were obtained that people who live close to the *Leuweung* Sancang Nature Reserve have high knowledge about *Kaboa* plants, such as the people in Sancang Village and Sagara Village, because the *Leuweung* Sancang Nature Reserve itself is part of Sancang Village and is a living place for *Kaboa* plants. In addition, because the location of Sancang Beach itself is connected to Cijeruk Beach which is located in Sagara Village and some people in Sagara Village work as fishermen, it allows the exchange of information between the communities including information about *Kaboa* plants, while the people who live in Karyasari Village and Karyamukti Village, some of the people do not know much about the existence of *Kaboa* plants on Sancang Beach, but the community knows about the story of Prabu Siliwangi in *Leuweung* Sancang. In line with the results of research conducted by Tambunan (2018) which shows that the location of residences that are near or far from the existence of mangrove ecosystems has an influence on a person's level of knowledge because the living environment is a link where one can see and pay attention to the existence of mangrove ecosystems.

People know the *Kaboa* plant and its presence on Sancang Beach, most know that the species must be protected given its very important benefits for the coastal ecosystem, but some people still do not know the cause of the reduction of the species in Sancang Beach and how to overcome the problem. Some people also do not know the rules regarding mangrove conservation and the sanctions imposed if they violate these rules. The level of public knowledge about *Kaboa* plants that are relatively good will certainly have a positive impact on efforts to conserve *Kaboa* plants on Sancang Beach.

Ethnoconservation Attitudes

Based on the distribution diagram of people's ethnoconservation attitudes based on attitude indicators as seen in Figure 11, differences in people's attitudes can be caused by several factors, namely the influence of experience, culture, and a person who is considered important. Experience is something that has been experienced by a person or oneself. Although some people have a low educational background, people have experience from seeing *Kaboa* plants first-hand. People also have experience taking advantage of the existence of *Kaboa* plants. Some people have experience from processing *Kaboa* plants into handicrafts and taking advantage of selling these handicrafts. In line with the opinion expressed by Setiastri et al. (2019) that community attitudes are formed from the experience of those who get economic results from mangrove management.

Culture is a work produced by humans formed from social norms and values (Ma'ruf, 2022). People who are close to *Kaboa* plants, namely the people in Sancang Village, Sancang people have a culture in the form of local wisdom consisting of norms, traditions, myths, rules, and prohibitions that are still valid and practiced for generations. According to Ferry (2019) local wisdom is one of the efforts made by the community as an effort to manage and preserve the environment. The indigenous people of Sancang use this local wisdom to protect the forest and the natural resources in it. The forms of local wisdom that are still valid include the existence of customary punishments or sanctions, where people should not damage places that are considered mystical or sacred because they are still in the belief that for anyone who damages, the Sancang tiger will pounce even though the tiger is very rarely encountered.

There is also a belief that *pamali* when going down to sea on Friday nights. In addition, according to the customary rules and beliefs that develop in the community for anyone who takes something from the forest or Sancang beach without permission, the perpetrator will get a disaster such as an accident or death. Among the community, there is also a belief in several types of wood that have certain properties, one of which is the *Kaboa* tree wood which is believed to have a 'maung Sancang' lever or the incarnation of Prabu Siliwangi. The myth has been known for generations and is part of *Leuweung* Sancang's identity. If people cut down or take the tree without permission, they will get an accident or disaster. However, people are allowed to pick up twigs or branches of *Kaboa* trees that have fallen or died. In addition, everyone who comes whether it is a visitor or a local community must be allowed to say hello or excuse me and people who come to the forest or Sancang beach with bad intentions will have a disaster. This makes people more afraid of sanctions from nature than social sanctions. However, based on the observations of researchers, some people began to abandon these rules and prohibitions, so that some of this local wisdom gradually faded and the cause was not yet known.

It is likely that people no longer believe in *pamali*, myths or things that are considered mystical because they are considered irrelevant to the conditions of the advanced era. In line with the opinion expressed by (Niman, 2019) where currently the local wisdom of its development has begun to fade and experience a decline in the heritage of noble values. The results of research conducted by Hidayati (2016) also show that the fading of local wisdom values is closely related to the decrease in empathy and togetherness in mutual aid activities in the community environment, a decrease in the community's sense of mutual ownership of natural resources in their area, and a decrease in harmonious relationships between fellow community members and the surrounding environment.

A person's attitude is also influenced by others who are considered important; the influence of others who are considered important here is the caretaker. A caretaker is someone who is given the mandate to guard and take care of places that are considered sacred by the community. The caretaker will usually tell what a person can and cannot do when visiting a place that is considered sacred. If a caretaker dies, his duties will be passed on to his children for generations. So far, the number of caretakers in Sancang Village is known to be more than 50 people. Because a person who is a caretaker is considered to know the history of *Kaboa* plants so that the community follows all the recommendations and prohibitions given, this can be proven by the attitude of the community who are required to ask permission in advance to the caretaker if they want to take *Kaboa* plants. This is in line with the opinion of Sujana et al. (2018) which suggests that a person's attitude will tend to follow and be in the same direction as someone he considers important. This is supported by research conducted by Fentria et al. (2021) which shows the results that other people who are considered important have an influence on the attitudes of peasant women in the Sustainable Food Yard program in Gunungkidul Regency.

In this study, all people have shown their desire for the *Kaboa* plant to remain sustainable and the legend does not fade, but the attitude shown by the community can also threaten the survival of the plant, such as the attitude of the people who take the *Kaboa* tree wood for economic gain. Although the community claims to only take a small part of the plant, if it is done frequently and without being accompanied by replanting efforts, the longer the plant will also run out. This shows that people only know that *Kaboa* plants must be protected but people still don't know how to protect these plants appropriately.

CONCLUSION

Based on the results of data analysis and processing, it can be concluded that there is a strong and significant relationship between indigenous people's knowledge of *Kaboa* plants and ethnoconservation attitudes. The factors that affect the level of knowledge of society are gender, profession, and living environment. Meanwhile, the factors that influence people's attitudes come from the experiences, culture, and influences of others who are considered important. In addition, the community already knows that *Kaboa* plants must be protected but the community still does not know how to protect these plants appropriately. These findings show that there is a need for environmental counseling and education regarding the conservation of *Kaboa* plants in a sustainable manner as an effort to improve community knowledge and attitudes. The community also needs to be motivated to maintain the mangrove ecosystem. The provision of motivation will have an impact on increasing the attitude of the community in their participation in protecting *Kaboa* trees.

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