THE ETHNOECOLOGY OF SASAK PEOPLE IN MANDALIKA, LOMBOK ISLAND LOCAL KNOWLEDGE AND WISDOM IN RELATION WITH LAND USE

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ABSTRACT

This current study is an ethnoecological study on land use for plant diversity by the Sasak people in Mandalika, Lombok Island, West Nusa Tenggara. Interview and direct observation methods were implemented. The study areas included the villages of Kuta, Mertak, and Sengkol. The results indicated four main groups of land: *Leleah* (a yard or home garden), *bangket* (rice fields, including the *bangket gora*; rice fields nurtured by rainfalls), *kebon* (gardens, including *kebon kayo* or garden of woody plants and *kebon elalo* or garden of crops), and *gawah* (forests, including *gawah mali* or sacred forests). This study results showed that despite the stress of a constantly changing environment and various restrictions and limitations, the ethnoecological knowledge in local wisdom is still maintained well.

Keywords: ethnoecology; land use; Lombok; Mandalika; Sasak

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INTRODUCTION

Ethnoecology is a branch of ethnobiology that focuses on the environments and conservation including conflicts that occur and the diminishing of traditional knowledge on the surrounding environments with solutions to the problems (Johnson & Davidson-Hunt, 2011; Iskandar 2016; Albuquerque & Alves, 2016). Thus, ethnoecology is more apparent in urban and suburban societies, particularly in the developing countries with conspicuous diversity of ethnics and cultures, such as Indonesia with one of examples is in the vicinity of Mandalika, where the transformation from village to urban areas is happening due to the rapid developments, particularly in tourism. In other words, in recent years ethnoecology has become the major issue in ethnobiology (Prado & Murrieta, 2015; Alves & Albuquerque, 2016).

The Sasak are the indigenous people and Lombok Island's dominant Austronesian ethnic group in the western part of the Lesser Sunda Island (Bellwood et al., 1995; Melalatoa, 1995; Salehudin, 2019). It is an ethnic group belonging to the Western Malayo-Polynesian group of Austronesian languages subgrouping, according to Blust (2013). Like the other Austronesian people, the Sasak also respects nature's balance, including the surrounding land, and places this in the central position in their daily lives, especially regarding cultural life and agriculture, such as food security (McVey, 1995). In other words, understanding the surrounding environment, including the land where they live, is regarded as immensely important by the Sasak to sustain life and prosperity (Telle, 2007; Wahyudin, 2018).

Regarding land use, the Sasak people have good knowledge and wisdom, particularly concerning agriculture (Rensch, 1930). They have been practicing the tradition presumably since the first arrival and establishment of the ancient Austronesian people, who later formed the Sasak people on Lombok Island (Bellwood, 1985; 1997a; 1997b; 2017; Blust, 1993; 1995). The tradition includes the selection of preferred species of plants based on the land characteristic and the plantation location. Unfortunately, due to climate change, successful crop harvesting is exceptionally difficult to predict.

Present-day globalization and modernization have forced the traditional Sasak communities to meet with the uninterrupted global changes. Consequently, traditional knowledge and local wisdom have been continuously faded (Sujarwo et al., 2014; Salehudin, 2019). In other words, the local Sasak traditional communities have gradually changed. According to Turnbull (2002), there are essential changes in society because of modernization and globalization. The statement is supported by Sunito (2004) and Hilmi (2016) that economic and social forces can destroy local communities' institutional and social structures. In Sasak communities, the effect was as early as the beginning of the 1970s by Krulfeld (1974). Nevertheless, the Sasak people have unique ways of dealing with the situation, including the land uses implementing their local wisdom and traditional knowledge. This is apparently related to the aim of this study, which is to improve our knowledge and understanding on the relation and connection between the Sasak people including their cultures with the biotas, especially plants and the adjacent environment to establish a better way of integrated conservation system in the area that equally involves the three elements described above. In other words, to understand how the Sasak people see their gardens as an act of conservation in relation to preserving both their lands and culture in this continuously changing world.

METHODS

The methods implemented in this current study follow Gerique (2006; see also Ruiz-Mallén et al., 2012). Data were obtained through interviews and direct observations. Interviews were conducted in an open-ended structure, mainly directed to traditional leaders, equal to the elders, or in Sasak language known as *hing adat* and also the members of the community that can provide accurate information about the characteristic and land use as well as the species of plants that grow on the land. Data about characteristics of informants as outlined in Table 1. A sampling of plants was carried out on taxa, which were unable to be identified in the field. The identification was later made at the Herbarium Bogoriense, Research Center for Biology, Indonesian Institute for Sciences (Lembaga Ilmu Pengetahuan Indonesia or LIPI) in Cibinong, West Java.

The study areas are generally included in the Mandalika area, located in Pujut sub-District, Central Lombok Regency, consisting of three villages: Kuta, Mertak, and Sengkol, particularly in the first three villages, where the Sasak people are concentrated (as seen in Figure 1). The main occupation of the Sasak people in Mertak and Sengkol villages is farming, particularly rice and crops. Whereas the people in Kuta village as traders or tourism (particularly as tour guides). Kuta village is the center for tourism in Mandalika areas; thus, it is

reasonable if their main income source is tourism. Mandalika is declared as one of the major tourist destinations in Indonesia or known as Special Economic Zones since 2017 (Santika et al., 2018).

Table 1. Characteristics of Informants

No.	Villages	Characteristics of informant	Quantity
1.	Kuta	Men, customary leader & farmer, age 46-55 years old	2
		Men, customary leader, age 56-65 years old	1
		Men, farmers, age 35-45 years old	2
2.	Mertak	Men, farmers, age 46-55 years old	1
		Men, farmers, age 35-45 years old	1
		Men, farmers, age 35-45 years old	1
3.	Sengkol	Men, farmers, age 46-55 years old	1
		Men, farmers, age 35-45 years old	1
		Total	10

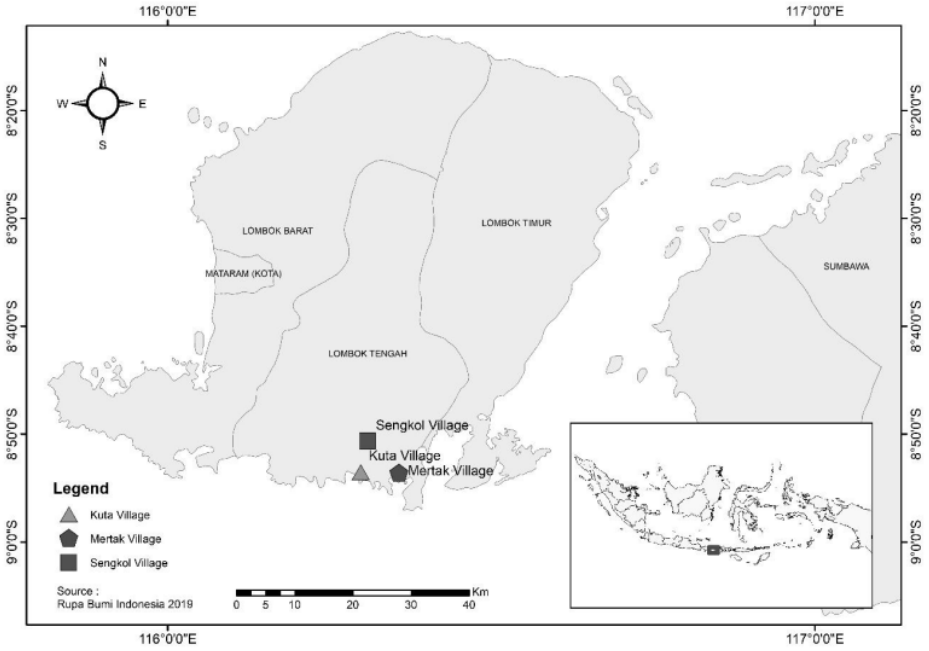

Figure 1. Study Area

RESULTS AND DISCUSSION

The agriculture of Sasak people who live in Mandalika areas generally follows the traditional system even though the system has faced challenges, such as climate change and technological and cultural advances. Nevertheless, the Sasak accepted the changes and regarded them as necessary to defend themselves and their families. Indeed, the Sasak understand that tradition or culture is not something static but dynamic. The following are forms of land use that are known to Sasak people in Mandalika.

Leleah (yard or home garden)

Leleah is defined as a piece of land that has certain boundaries, around which there is a residential building and has a functional relationship to the economy, biophysics, and socio-culture with its occupants (Junaidah et al., 2015; Silalahi, 2016). The role and use of yards vary, depending on the level of need, socio-culture, community education, and ecological factors. In some areas, especially in rural areas, the home garden has the purpose of fulfilling daily food needs; thus, it is often referred to as living barns or living stalls, as seen in Figure 2. The study area is defined as the house yard in the research location

ranges from 400 to 500 m^2, with a residential building area ranging from 100 to 150 m^2. The boundaries of home gardens in the Mertak and Sengkol villages are not definable, while in Kuta village, they are definable in stone fences.

The diversity of plant species cultivated in Mertak and Sengkol, especially food crops, includes the *ambon jama* cultivar of cassava (*Manihot esculenta*; Euphorbiaceae), maize (*Zea mays*; Poaceae), *sekeraya balanda* or soursop (*Annona muricata*; Annonaceae), *nangka* or jackfruit (*Artocarpus heterophyllus*; Moraceae), *pauk* or mango (*Mangifera indica*; Anacardiaceae), *punti* or banana (*Musa* spp.; Musaceae), *gedang* or papaya (*Carica papaya*; Caricaceae), and *pace* or moringa (*Moringa oleifera*; Rubiaceae). Interestingly, the word for papaya in the Sasak language, *gedang*, is similar to the Sundanese and Balinese (Sujarwo et al., 2020). In other words, it is most likely that the papaya was brought to Lombok by the Balinese or the Sundanese. The Balinese have strong linguistic and cultural connections with the Sasak. Papaya was introduced to Bali from Java, but the fruit might have been introduced to the island by the Balinese. Thus, at least ethnobotanically, papaya was likely introduced by the Balinese instead of the Sundanese (Ochse, 1931). Certainly not by the Javanese, who call papaya *kates*. Papaya was introduced to Lombok Island recently, presumably around the 19th century. Papaya (*Carica papaya*) is not an indigenous species of Flora Malesiana, in which Indonesia is the most significant part of the backbone of the floristic region. The species might have been introduced to Indonesia by the Portuguese or Dutch in the 17th or 18th century (Clement, 2008). It was already a widely cultivated plant in Indonesia in the early 18th or 19th centuries (Ochse, 1931). Further study is needed.

Ornamental plant species are rarely found in Mertak and Sengkol villages. On the contrary, in Kuta village, the ornamental plant species are abundantly planted, such as *kemboja* or *jepun* (*Plumeria* spp.; Apocynaceae, plumeria or frangipani in English) with wide varieties in flower colors, such as white, yellowish-white, pink, and dark red, *waru* (*Hibiscus tiliaceus*; Malvaceae), *soka* (*Ixora concinna*; Rubiaceae), and hibiscus (*Hibiscus rosa-sinensis*; Malvaceae). *Jomtal* or *lontar* (*Borassus flabellifer*; Arecaceae, Palmyra palm in English) is commonly found in Kuta village. However, the leaves are not harvested for handicrafts as can be found in Samawa people in the neighboring island, Sumbawa (Rahayu & Rustiami, 2017), some ethnic groups in East Nusa Tenggara (Tambunan, 2010; Marlistiyati et al., 2016) or Sulawesi (Nasri et al., 2017). The reason the people of Kuta village do not harvest the leaves of this species is still shrouded in mystery.

Unlike the other areas in Indonesia, such as in Lampeapi Village, Wawonii Island, Southeast Sulawesi (Rahayu et al., 2009) that utilize the home gardens for various activities to support the local economy, the people in the study areas do not use their home gardens for the economic-based activities. They just left the gardens empty so they can be used for drying rice and corn grains. There are also no medicinal plants planted in the home gardens, as they are usually found in other villages in Indonesia (Rahayu et al., 2020). The reason for this is still unclear. The possibility of fading knowledge of medicinal plants in young generations of house owners is terrifyingly suspected to happen. Further study is necessary before is too late.

Figure 2. *Leleah* (yard or home garden)

***Bangket* (rice fields)**

In the villages observed in this study, the rice fields were primarily located in the river banks or nearby flat areas. The rice fields are not very far from residential, usually about 500 meters. Very few rice fields were found in the Mandalika area.

The local people explained that rice fields are opened in lowland areas and carried out only once a year; thus, rice is harvested yearly. It is related to the long dry season and high soil evaporation; therefore, land cannot store water

sustainably and dries up quickly, as seen in Figure 3. This traditional rice planting system is a part of Sasak's rice-based ceremony called *ga ngampai*, and it is commonly found and practiced by Sasak people in East Lombok (Rahayu et al., 2016). Unfortunately, it was abandoned 15 years ago and is believed to be related to the appointment of the Mandalika area as one well-known tourist destination in Indonesia; thus, people were shifted from agricultural-based to tourism-based communities (Sujarwo, 2019). In other words, their original agricultural way of life has been changed.

'Pare' is the indigenous Sasak word for rice (*Oryza sativa*) and usually refers to *O. sativa* var. *javanica*, the indigenous rice cultivar from Sundaland. It is an Austronesian word shares throughout the Austronesian world (Bellwood et al., 1995; Blust, 2013). It is also to indicate that Sasak people and language are undoubtedly Austronesians. The rice cultivars commonly planted by the Sasak in the three villages are *pare rau*, *pare lendah* or *pare bulu* (husked rice), *reket*, and '*pare sentul*. *Pare bulu* is the most commonly planted rice cultivar preferred due to the taste. It is more delicious than the other cultivars. *Bulu* or husked rice cultivars are the backbones of *O. sativa* var. *javanica*; so, much that this morphological character has long been regarded as the most important distinctive character of the variety as only in this variety the obvious long husks are found (Mackill & McKenzie, 2003). The *javanica* variety in Indonesia was often classified as a separate group distinct from the *indicas* and *japonicas*. In addition, many cultivars grown under upland (un-flooded) conditions were considered similar to *javanica* cultivars (Mackill & McKenzie, 2003).

As Indonesia is undoubtedly the backbone of Austronesian people and civilization, the *bulu* rice cultivar is also characterized by Austronesia. Thus, related with the preference of the *bulu* cultivar or *pare bulu* by the Sasak people is also to indicate that the Sasak are ethnoecological Austronesians. Unfortunately, there has been no serious effort to conserve the cultivar. It needs to be done immediately before the cultivar is disappeared due to the massive replacement by the more frequently planted cultivars released by the International Rice Research Institute (IRRI), which is massively done in various Southeast Asian rice nations, such as Indonesia and the Philippines (Chang, 2003).

The unique phenomenon related to rice in the Mandalika vicinity is related to rice nutrient enrichment (i.e. fertilizer) and the Mandalika Sasak's *nyale* tradition. The fertilizer of rice is done two to three times in a planting period and is usually carried out during the *nyale* season, which is related to the breeding season of the sea worm from the species *Eunice siciliensis*. When the *nyale* season starts, the fertilizer of newly planted rice is also begun by irrigating the rice fields (with newly rice or rice seedlings previously planted) with freshwater channels that have contacted the *nyale* worm population. The people believe that *nyale* worms are full of nutritious materials suitable for rice development. Jekti et al. (2008) and Erviani et al. (2019) suggested that the *nyale* worms contain various good nutrients for the development of young plants through the ability of worms to inhibit bacterial growth. The nutritional contents of *nyale* worms include protein, carbohydrates, fats, fatty acids, ash, amino acid, vitamins A, B1, B6, B12, E, and minerals P, 12, Ca, Mg, C (Silaban, 2012; Liline et al., 2016). The phytochemical compounds in *E. siciliensis* are alkaloid, flavonoid, anthraquinone, steroid glycosides, flavonoid glycosides, and saponins (Erviani et al., 2019).

In the three observed villages, the Sasak people recognized the other cultivating rice known as *bangket gora* or rice plantations fed by rains, not through the irrigation system. This *bangket gora* is similar to what is known as *padi gogo* or *padi huma* in the other parts of Indonesia. This rain-fed rice plantation is generally known as upland rice and is regarded as the style of cultivation typical for *O. sativa* var. *javanica* (Mackill & McKenzie, 2003). It is presumably the oldest form of the rice plantation system in Indonesia. In other words, the earliest rice plantation system in Sundaland, a system which is still continuously practiced in Indonesia (including by the Sasak in Lombok) for thousands of years; the Austronesian rice. Despite the name upland rice, this rain-fed rice cultivation can also be done in lowland areas with fairly open flat, broad areas such as the study areas. Thus, *bangket gora* is *padi gogo* or upland rice. As a rain-fed rice field, fertilizer is not needed in *bangket gora* as the nutritional elements can be attained directly from the soil nurtured by the tropical rain.

In an ordinary submerged rice plantation system or *sawah*, the rice in the rain-fed cultivation is also harvested yearly. Nevertheless, the rice fields are usually located on a hillside and far from residential locations in the study areas. The most common rice cultivar planted by the Sasak people is the red, known as *pare bea*, a variation of the *pare rau* rain-fed rice fields. Regarding the people's preference, *pare bea* cultivars rank second only to *pare bulu*. Regarding the red rice cultivar, the red rice is the weedy form of *O. sativa* (Mackill & McKenzie, 2003); thus, this red cultivar's presence in Lombok confirms the identification of the most common rice in Lombok as *O. sativa* var. *javanica*. In other words, the rice on the island is an original of the *javanica* variety.

Bangket (the ordinary irrigated rice field) *Bangket gora* (upland rain-fed rice)

Figure 3. *Bangket* (rice fields)

***Kebon* (garden)**

The Sasak people define *Kebon* (garden) in the observed villages as a piece of land planted with domesticated horticultural crop plants, such as corn or cassava. *Kebon* also includes abandoned plantation areas, such as tobacco plantations, as seen in Figure 4. The tobacco or *bako* plantations in the local Sasak language (*Nicotiana tabacum*; Solanaceae) were abandoned ten years ago. The result of this study indicated that this abandonment was apparent since tobacco is more vulnerable to diseases and other climatic-related maladies than corn or cassava. In other words, even though these three plant species are not native to Indonesia, the risk is conspicuously higher in tobacco.

Corn and cassava are more widely planted in Indonesia. They are preferred to be produced mainly in dry areas, such as in most areas within the Lesser Sunda Islands (Nusa Tenggara), including many areas in Lombok island and beyond (Atok et al., 2010). The cassava is even consumed as a staple food in the absence of rice in various areas in Sulawesi (Khairani & Dalapati, 2013). Numerous other crops are also planted in the gardens. This kind of garden is known as *kebon elalo*. The crops planted are *ambon jama* (sweet potato, *Ipomoea batatas*; Convolvulaceae), *antap* (long benan, *Vigna sinensis*; Fabaceae), *kacang* (peanut, *Arachis hypogaea*; Fabaceae), *terung Aceh* (*Solanum lycopersicum*; Solanaceae), *sebie bea* (chili, *Capsicum annuum*; Solanaceae), *sebie odah* (cayenne pepper, *Capsicum frutescens* Solanaceae), *terung* (eggplant, *Solanum melongena*; Solanaceae), and *lembain* (spinach, *Amaranthus hybridus*; Amaranthaceae). They are mainly harvested for daily needs. *Kebon kayo* is a kind of *kebon* (garden) that are planted usually with perennials crops or woody plants, such as *pauk* (mango, *Mangifera indica*; Anacardiaceae), *nangka* (jackfruit, *Artocarpus heterophyllus*; Moraceae), *nyiur* (coconut, *Cocos nucifera*; Arecaceae), *mahoni* (mahogany, *Swietenia mahagoni*; Meliaceae), *mahoni daun besar* (*S. macrophylla* King), and *jati* (teak, *Tectona grandis*; Lamiaceae).

Kebon *Kebon Kayo* *Kebon Elalo*

Figure 4. *Kebon* (garden)

***Gawah* (forest)**

Gawah (forest) is defined as an area of land where various wild woody plants are found and not yet opened as cultivated areas, as seen in Figure 5. In other words, *gawah* is a wild area, a non-anthropogenic area, or forest in its purest form. Recently, only a few areas in Mandalika can be regarded as *gawah*. One of the few areas left is Mount Tunak, which is located within the vicinity of the study areas. The *gawah* (forest) is now protected as a part of Mount Tunak Ecotourism Park (Taman Wisata Alam Gunung Tunak) (Hasanah et al., 2020).

According to Mansur (2020), the common species found in *gawah* within the Mandalika area are *eubalang* (*Aglaia argentea*; Meliaceae), *beberas*

(*Drypetes neglecta*; Putranjivaceae), *nangke-nangke* (*Glycosmis pentaphylla*; Rutaceae), and *ringe* (*Grewia eriocarpa*; Malvaceae). These are plants usually found in secondary forests. The primary forests in the vicinity of Mandalika, including Mount Tunak, are generally found in the hill slopes. So far, there has been no logging activity encountered during the fieldwork. The people frequently harvest fruits, such as jackfruit, rambutan (*Nephelium lappaceum*; Sapindaceae), and durian (*Durio zibethinus*; Malvaceae).

Gawah mali is a terminology known traditionally by the Sasak people in Mandalika for sacred forests. One of them is the sacred forest of Sade, a well-known tourist area in Mandalika, approximately 6.3 km north of Kuta village. The dominant tree species found in the sacred forest are *keling* (*Dalbergia latifolia*; Fabaceae), *kukun* (*Schoutenia ovata*; Malvaceae), *kesambi* (*Schleichera oleosa*; Sapindaceae), and *sengkulit* (*Tamarindus indica*; Fabaceae).

The people believe that if a tree in the sacred forest is damaged or cut downed, a calamity will come, including natural disasters or pests. It is reasonable as cutting down trees will cause landslides, floods, and wild animals will attack plants in the garden. The interesting thing found in this study is related to one of the tree species found in the *gawah mali* described, *kukun* (*Schoutenia ovata*). In Java, this species is known as *walikukun* and is regarded sacred by the Javanese (Heyne, 1927). The Javanese believe that the tree can spiritually protect the house from evil spirits and is usually planted in the four corners of the home yard. The possibility that the Sasak people also believe in the spiritual use of the tree is unknown. Nevertheless, one of the common tree species found in *gawah mali* or sacred forest is *Schoutenia ovata,* or *kukun* in Sasak language, sounding conspicuously similar to *walikukun* in Javanese is indeed interesting and may refer to the same spiritual practices. Further study is needed.

Dalbergia latifolia is a threatened species in Indonesia (Lakhey et al., 2020), and the sacred forest of Sade is undoubtedly a good place for conserving the species. The sacredness of the *gawah mali* has a decent benefit for the plant conservation on the island, where the primary lowland tropical rainforests have already experienced inevitable diminishing. In other words, *gawah mali* can be regarded as an in-site conservation site.

Gawah

Gawah Mali

Figure 5. Gawah (forest)

Furthermore, the local knowledge and wisdom of the Sasak people in Mandalika regarding land use is a collection of their life experiences in interactions with the environment and others, including the influence of the immigrants. In other words, the local knowledge and wisdom of the Sasak people are dynamic; thus, they can change.

CONCLUSION

Local knowledge and wisdom in Sasak people result from interactions between the Sasak people and surrounding nature, including plants. The plant-based classification of land in Sasak communities observed in this current study shows that plants have an important role in human life and vice versa. *Gawah mali* can be regarded as an in-situ conservation site typical to the Sasak people.

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