Seminar Nasional Perhimpunan Masyarakat Etnobiologi Indonesia
ISSN (E): 2776 - 6322

Plant Uses and Conservation in the Culture of East Sumba

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***Abstract*—This study mainly explored plants uses among East Sumba People and how they relate to conservation efforts, especially in several villages, including Lambanapu Village, Kampung Adat Wunga, Prailiu, and Praiyawang. The methods used in this study were combinations of field data collections, interviews, and observations. The findings showed that the traditional uses of plants fall into five use-categories: plants for weaving tenun ikat, building traditional houses, food sources, medicines, and rituals. Local people performed conservation efforts by planting the necessary plants in their garden, protecting local forests, and only using plants/trees which are ready to be harvested. In some occasions, rituals were also performed before harvesting the plants. The traditions showed that Sumba people respect the supernatural beings and the harmony between nature and human.**

Keywords— Plant conservation, culture, East Sumba, local knowledge, plant uses

I. INTRODUCTION

Indonesia is rich for its culture that spans along its archipelago. The richness of Indonesian culture has been attractive to local and foreign visitors that brings them to admire the varieties of ethnicities, languages, architectures, indigenous garments, local beliefs and rituals. All of these identities influence how local people use their natural resources, as much as how natural resources transform social-cultural life of an ethnic group (Sumanto and Takandjandji, 2014; Sumanto, 2014; Sujarwo, 2019).

One of the exotic regions in Indonesia that shows the close connection between natural resources usage and cultural aspects of the society is East Sumba. The culture of East Sumba people inevitably depends on natural resources available for them. For example, in building their traditional houses (uma), all of the materials are obtained from the local forests. Sumba people will seek individual trees for building the house pillars. These certain trees, however, are now difficult to find, due to the forest degradation and massive felling of natural forest. The need for building houses using certain trees and the availability of the forest in providing those materials have created a conflicting agenda in terms of plants conservation and cultural preservation (Santoso, 1980; Sujarwo and Keim, 2017). At the point of views of local people, their practices in harvesting trees for building traditional houses are believed to be ethical, following the practices of their ancestors for many generations. In this regard, local people consider that their relationship with nature is sacred, so that they have to perform ceremonies and to give offerings to the deities. This ceremony, from the local people perspective, is how they practice conservation. They cut down trees and harvest forests produce by a strict customary rule. One of the rules, for example, is related to the size and age of such trees before harvested to build houses (Purnama and Hastomo, 2013).

The example mentioned above shows how local culture helps to shape forest conservation. Nonetheless, we have many other models in the literatures, such as Njurumana and Prasetyo (2010) who focused on how people rehabilitated forest in West Sumba, and Takandjanji (2015) who studied the use of plants as natural dyes in Lambanapu, Mauliru, Watu Hadang, and Kaliuda. Also, we have Sumanto dan Takandjandji (2014) who portrayed the use of natural woods in Timor Tengah Selatan District. In the geographical context of East Nusa Tenggara, although we do have some examples, studies regarding ethnobiology of plants and culture need to be explored more. Based on this perspective, the study about plant uses and indigenous knowledge will bring new concepts about plant conservation which is specific to East Sumba context. Not only does this study add to the available body of knowledge, but does also it bring out the cultural identity of East Sumba people

II. METHODS

STUDY AREA

The study was located in Lambanapu Village, Kampung Adat Wunga, Prailiu, and Praiyawang, East Sumba Regency, East Nusa Tenggara Province. The study sites were in four different villages selected based on the location of the cultural existence of the East Sumba community. Lambanapu village is the centre of tenun ikat in East Sumba. In contrast, Prailiu village and Praiyawang are well-known as Kampung Raja-raja, which are the cultural centre of the East Sumba community. Lastly, Kampung Adat Wunga is believed to be the first settlement in East Sumba. Our guide provided us with the necessary information to select the locations. The guide was well-informed with the situation in East Sumba, as he has been working as a tourist guide since 2015.

DATA COLLECTION

The data in this study were divided into two parts, i.e. secondary data and primary data. Secondary data was the data obtained from the results of literature studies. In comparison, primary data obtained from the fieldwork. The following data collection methods were employed. First, fieldwork aimed to get primary data to identify the relationship between culture and the use of forest products and environmental sustainability. We employed interviews and field surveys.

The interviews aimed at obtaining information regarding the culture, including the types of plants used, and cultural wisdom towards conservation. The interviews were conducted with local people who know the culture of the Sumba community, using an open interview method. Respondents were selected by snowball sampling method. A potential participant who is knowledgeable about the local culture was selected. This person was then asked to refer other participants with similar knowledge (Creswell, 2003). The study examined three traditional villages (Wunga, Prailiu and Praiyawang) and one cultural village known for its tenun ikat, Lambanapu Village. In traditional villages, the authority to knowledge is often owned by the king or influential people, so the key informants in this study were these people. Interestingly, mere people and commoners were reluctant to be our respondents, that they addressed the elderly and the influential people to provide information to us. Based on this situation, we selected four people in Prailiu Village, one person in Wunga Village, two people in Praiyawang, and three people in Lambanapu Village were interviewed in-depth during two visits to East Sumba (each visit lasted from 5-7 days). We used pseudonyms in writing this publication.

We conducted field surveys to determine the plant species, as well as to document cultural rituals or cultural ornaments that utilize such plants. In Lambanapu Village, the method used in the survey was the transect walk, by observing the research location directly by referring respondents as pointers/resources (Flora Fauna International, 2013). Two local guides helped us in translation during data collections. In Prailiu Village, Wunga Village and Praiyawang Village, the survey was conducted by observing the plants in the two villages and the gardens around the village. The study conducted three visits to the local markets (Pasar Inpres) to observe and record the various plants and forest products that were traded.

DATA ANALYSIS

Data obtained from literature studies and field research were in the form of qualitative data. The data were processed, then were analyzed using qualitative descriptive analysis, to describe the data that have been collected.

III. RESULTS AND DISCUSSION

Most of the people of East Sumba work in the agricultural sector, including farming and animal husbandry. This kind of livelihood is possible because the landscape of East Sumba consists of paddy fields, savannas, and mangrove forests (Mulyoutami et al., 2016). This study revealed the various types of plants used by the Sumba people. Plants used in Sumba are categorized as follow: 1) woven materials, 2) building materials and traditional houses, 3) food materials, 4) medicines, and 5) rituals. Figure 1 showed the percentage of usage in each category. Plants and forest products are mostly used for providing foods (48%), followed by woven materials (21%), buildings and traditional houses (13%), medicine (9%), and rituals (9%).

Plants in the making of tenun ikat

The use of plant species as woven materials (either for coloring or making the textiles) was only second place after food. It indicated that weaving is a very important cultural aspect in people's lives. Tenun ikat Sumba has been both the cultural identity and the major contributor to household economy. It was estimated that a tenun ikat home industry supports 30% of the household income (Babang, 2008).

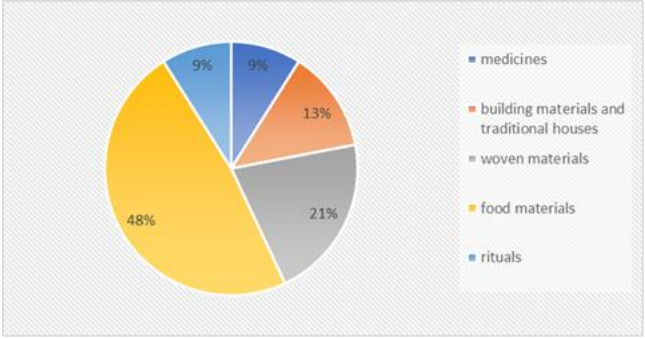

Figure 1. Types of plants use in the East Sumba community, such as weaving material, building materials and traditional houses, food, medicines and rituals

Table 1 showed that at least 27 species were mentioned by the people of Lambanapu Village as the plants used for the weaving process. There are six species used as natural dyes in tenun ikat, such as Ai iju (Arcangelisia flava), mahoni (Swietenia macrophylla), Wuara (Indigofera tinctoria), Kandara (Caesalpinia sappan), kombu/mengkudu (Morinda citrifolia), Wuara (Indigofera tinctoria), Kandara (Caesalpinia sappan), kombu/noni (Morinda citrifolia), and Ndongu (Rhizophora sp.). This finding is almost similar to the result on weaving dyes plants in Kaliuda Village, East Sumba (Seran and Hana, 2018). The difference is that Kaliuda Village does not use Kandara (Caesalpinia sappan), and Ndongu (Rhizophora sp.). In another study, it was mentioned that Swietenia macrophyla was the most common colouring that provided red colour when mordanted by lime (Ndamunamu et al., 2019). The differences of results showed that much detail of the weaving process, including the natural dyes used in the process, is still open for further studies.

BUILDING MATERIALS AND THE "MARAPU"

Besides being used for weaving, the Sumba community used plants for building materials, especially for the traditional house construction. Local people believe that plants in the forest have a guardian spirit, so that to cut down the trees and transport them to settlements requires a ritual that involves a pig slaughtering ceremony. During the ceremony, a unang (a spiritual leader) performed the ritual and recited prayers. The tree-pulling ceremony is a unique ceremony for taking the trees in the forest using ropes from rattan and other vines that can be found. When the rattan cannot be found, people used ropes from gai plants. According to the existing literature, Sumba's traditional house consists of several types. Uma is a traditional house used for rituals, a hamlet house used for daily living and a garden house which is used as a place to stay for the community when gardening (Hariyanto et al., 2012).

The construction of a traditional house is a sacred event that involves a fairly long process (Sujarwo and Keim, 2017). Based on the interviews with elders of Wunga Village, it was known that the trees used to make the houses were obtained from the forest. The trees were large enough and were brought to the village by using manpower. Generally, the main part of the house consists of four main pillars and is

Table 1. Types of plants used for the weaving of tenun ikat

Local Name (Indonesian)	Sumba's Name	Latin	Family	Use
Bambu	Bambu	*Bambusa sp.*	Poaceae	Stem and leaves: woven tools
Cendana	Ainitu	*Santalum album*	Santala-ceae	Woods: fragrance
Dadap	Walakari	*Erytrina sp.*	Fabaceae	Inner wood: woven tools
Damar Hijau	Padamu	*Agathis dammara*	Araucariaceae	Stem and leaves: fixation of the colour blue
Gandarasa	Landu-kaka	*Justicia gendarussa* Burm.f.	Acantha-ceae	Root: Indigo colour
Gebang	gewang/ kalita	*Corypha gebanga*	Arecaceae	Leave: Motive fastener
Jati Belanda	Jati	*Guazuma ulmifolia*	Sterculiaceae	Woods: Weaving tool
Kapas	Kamba	*Gossypium hirsutum* L	Malvaceae.	Fibre: Woven yarn material
Kayu kuning	Ai iju	*Arcangelisia Flava* Merr	Menispermaceae	Wood and roots: Dye
Kecubung	Wala mbungur	*Datura metel*	Solanaceae	All parts: Natural pesticides, natural oil
Kelapa	Kokur	*Cocos nucifera*	Arecaceae	Coconut shell: Loom tools
Kemiri	Kawilu	*Aleurites moluccana* (L.) Willd.	Euphorbi-aceae	Nuts: Color enhancer/preservative
Kunyit	Wingir	*Curcuma longa*	Zingibera-ceae	Rhizome: the colour yellow
Loba	Luaba	*Syrumplocos sp.*	Symplo-caceae	Bark and all parts: Color enhancer/fixation
Lontar	Menggit	*Borassus flabellifer*	Arecaceae	Leaves: Thread / woven storage
Mahoni	Mahoni	*Swietenia macrophylla*	Meliaceae	Bark, wood, leaves: Dye
Nangka	Nangga	*Artocarpus heterophyllus*	Moraceae	Wood: Dye
Nila	Wuara	*Indigofera tinctoria* L	Fabaceae	All parts: Blackish blue/ indigo
Mengkudu/pace	Kombu	*Morinda citrifolia* L	Rubiaceae	Roots: Red colouring
Pule	Airita	*Alstonia scholaris*	Apocyna-ceae	Bark: Indigo blend ingredients
Randu alas	Rongu	*Gossypium hirsutum* L	Malvaceae.	Bark: Natural oil
Secang	Kandara	*Caesalpinia sappan* L	Fabaceae	Wood: the colour pink
Ubi kayu/Singkong	Luai	*Manihot utilissima*	Euphorbia-ceae	Starch: help to smooth the weaving process
Tingi/Bakau	Ndongu	*Rhizophora sp.*	Rhizophoraceae	Wood, bark, leaves: Brown colouring
Turi	Wunga	*Sesbania grandiflora*	Fabaceae	Bark: Blue fixation
Waru	Kabaru	*Hibiscus tiliaceus*	Malvaceae	Fibre: Thread fasteners (tools)
Widuri	Wangga kali	*Calotropis gigantean*	Apocyna-ceae	Leaves: Binder, natural pesticides

added with eight other pillars, so that in total requires 12 large trees. The tree-felling ceremony for the house construction is followed by one pig slaughtering.

The use of alang-alang (Imperata cylindrica) to build roof is also an interesting structure of the traditional Sumba house. According to Bapak Umbu, the roof setting of the alang-alang reflects 'seven seas and eight islands that were passed by ancestors until they reached Sumba'. He believed that Wunga is the oldest settlement, and the word Wunga means turi flower. The roofs of traditional East Sumba house are architecturally distinct it is usually built as a very high roof similar to an old limasan house of Java people. Based on local beliefs, the highest part of the roof is the place of the deities or Marapu. It is the sacred part of the house that offerings are often given to this place. The middle part of the house or alam tengah belongs to human beings, whereas the underpart of the house or alam bawah is where the spirits live.

The types of trees and plants used to build the traditional houses in Sumba can be traced from 15 species belonging to seven families. Injuwatu (*Pleiogynium timoriense*) is often used for the main pillar because it can reach a large size with a strong and durable wood. Other plants used for building houses included *Tetrameles nudiflora* (marra), *Corypha utan* (gewang/kalita), *Borassus flabellifer* (menggit/lontar), *Ceiba pentandra* (baru/kapok), *Gossypium hirsutum* (rongu/randu alas), *Syzygium acuminatissimum* (ai lobung), *Palaquium* sp. (ai kaduru), *Imperata cylindrica* (alang-alang), *Casuarina equisetifolia* (ai kajiwu), *Calamus rotang* (rotan/rattan).

Figure 2. Traditional house in Praiyawang

TRADITIONAL STAPLE AND LOCAL CULINARY

The third category of plant use in East Sumba was food. The list of food plants obtained in this study came from interviews with the community, and visited to traditional markets. Still, there was no distinction between forest products and agricultural products. The study recorded 62

plant species used as food sources and a daily staple of Sumba people. Among the list, the carbohydrate sources of Sumba people included *Dioscorea esculenta* (litang/gembili), *Solanum tuberosum* (kentang), *Sorghum bicolor* (watar hamu), Colocasia esculenta (hili/talas), *Ipomoea batatas* (katabi/ubi jalar), *Manihot esculenta* (luai/ubi kayu), *Dioscorea alata* (luwa/uwi), *Dioscorea hispida* (uwi gadung). Among cultures in Indonesia, there are variations in carbohydrate sources, people in East Indonesia are known to have more varieties of the staple. Traditionally, people of Sumba prepare their food by boiling, grilling, and steaming.

The 62 species as a local source of food in this study was based on traditional knowledge of people. These need to be preserved because food security is one of the critical issues among Sumba People. With an arid land, they are prone to lacking food, especially during the dry season. In other parts of the world, similar studies to preserve local knowledge of foods have also been conducted. For example, in Thailand, 77 species were recorded (Setalaphruk and Price, 2007), and 71 species in Poland (Łukasz, 2008).

PLANTS FOR MEDICINE AND RITUALS

In addition to the three categories above, there are still more use-categories, i.e. for medicines and rituals, although the number is not significant. Based on the information obtained, there were 11 plants used for traditional medicine and ten plants used for rituals. In this category, sirih (*Piper betle*), pinang (*Areca catechu*) were important plants used for rituals. The importance of sirih pinang in Sumba people rituals has also been recorded in many texts, including those which have been documented by the Ministry of Education and Culture (Soelarto, 2000). The fruit of Piper betle and the fruit of Areca cathechu are often eaten together, accompanied by kapur (limestone). This condiment is often served to honour guests, and as offerings to the holy deities in the Marapu beliefs. Unlike in Balinese tradition that often uses flowers for offerings, people in Sumba rely on sirih-pinang (Sujarwo et al., 2020). One of the reasons is that Sumba is very dry land that does not allow for varieties of flowering plants to flourish.

CONSERVATION ISSUES

Other than traditional and sustainable practices of plant harvesting and usage, some villages in East Sumba have been developing conservation strategies for protecting their botanical resources. This phenomenon could be observed in Lambanapu Village. As an infamous village for tenun ikat products, Lambanapu has been included in a conservation project. The project was carried out by Sekar Kawung, an organization that focuses on preserving traditional cloth. In Lambanapu, it was built a nursery to conserve local plants that are used for weaving.

At the same time, complementarily to the project, the making of indigenous fabric called tenun ikat has shown how local culture helps to conserve nature. Tenun ikat has long been a part of Sumba culture. People use tenun ikat as essential elements in traditional ceremonies and rituals associated with a wedding, child-birth, and mourning of the deceased. Tenun ikat has become major commodity, and the tourists' demands of the garments are rapidly increasing. Yet, the making of tenun ikat depends heavily on certain plants as compulsory materials for the threats, the dyeing, and the preservation of the garments. It is interesting to see that the productivity of tenun ikat is reportedly linked to the availability of plants being used, unfortunately some of the plants can only be found in local forests (Takandjandji, 2015). Hence, local craftsmen develop the ideas of protecting the forests, in order to protect their precious materials in the making of tenun ikat.

Figure 3. Sirih and pinang sold in a local market in Waingapu, East Sumba

Before the project, people in Lambanapu have planted plants used in the weaving process. In Lambanapu, for example, there is a designated garden planted by the community to produce plants that are used for weaving tenun ikat. So, it is common to see that Lambanapu's home gardens are rich with local plants as weaving materials, such as Moringa, dadap and cotton. This is a simple conservation effort carried out by the community.

However, there is also a certain plant which could not be domesticated by locals of Lambanapu; hence they still have to rely on wild harvesting in the forests. For example, Loba (*Symplocos* sp.), is an important element for colour fixation agents. The leaves of Loba are traded in the local market, and harvested from the forest. Local people, such as Bapak Ndapakamang, understood that continuous harvesting of Loba from the forest threatens the sustainability of this tree. However, he and other craftsmen still could not figure out how to plant Loba in their home-gardens, hence relying on the forest was their only way to supply Loba. They have tried other options to replace Loba but was no success.

Figure 4. The barks of loba were sold in Pasar Inpress, Waingapu

Table. 2. Medicinal plants listed by respondents

Indonesian	Sumba's name	Latin name	Family	Use purpose
Kunyit	Kunyit	*Curcuma longa*	Zingiberaceae	Rhizome: *jamu* (traditional concoction), treating the wound
Jahe	Jahe	*Zingiber officinale*	Zingiberaceae	rhizome: *jamu* (traditional concoction), treating flu or cold
Kencur	Kencur	*Kaempferia galangal*	Zingiberaceae	Rhizome: *jamu* (traditional concoction), cold and cough
Kayu manis	Kayu manis	*Cinnamomum verum*	Lauraceae	Bark: treating cold
Pandan wangi	Pandan	*Pandanus amaryllifolius*	Pandanaceae	Leaves: insect repellent
Delima	Delima	*Punica granatum*	Lythraceae	Fruits: red-eye/ eye inflammation
Brotowali	Purirahu	*Tinospora crispa*	Menispermaceae	Leaves and stem: malaria
Pule	Tadarita	*Alstonia scholaris*	Apocynaceae	Sap: abdominal pain
Asam	Kamaru	*Tamarindus indica*	Fabaceae	Leaves: use for bathing after a patient recover from an illness
Kosambi	Kahenubi	*Schleichera oleosa*	Sapindaceae	Leaves: refresh a patient after an illness (to bath with)
Gandapura	Kahalawan	*Gaultheria punctate*	Ericaceae	All parts: gastric problems

In addition, the local craftsmen maintain that they need more knowledge on which parts of the plants are truly effective to be used in the process of making tenun ikat. For example, for many generations, they learn that all part of loba must be taken to make the tenun ikat. According to the new knowledge, in fact, the craftsmen only need the loba leaves, and not all parts of it. Hence, from this information, we infer that although local initiatives driven by traditional knowledge have been able to conserve biodiversity resources in East Sumba, the scientific knowledge about plants, the parts of plants that can be used to make tenun ikat, and how to domesticate the plants are urgently needed to support the traditional conservation efforts.

Similarly, people in Sumba also face the issue of the making of the traditional house. In their traditional custom, a traditional roof is made of alang-alang (*Imperata cylindrica*) which was once abundant in the savannah. Ibu Maria from Prailiu, for example, said that as the savannah gets drier, alang-alang is limited, and are not enough to build houses. As a result, today, even traditional houses use a commonly found material in markets, made from zinc and aluminium.

Figure 5. A local house with roofs made of metal (possibly zinc)

IV. CONCLUSION

The people of Sumba exhibit local wisdom using plants for many purposes, including for building materials, woven materials, food, medicine and rituals. In total, this study recorded 48% of plants used for food sources, 21% for weaving in tenun ikat, 13% for building houses, 9% for medicine, and the last 9% was for rituals. The uses of plants among Sumba people are governed by local custom and law. For example, harvesting trees for building houses is always accompanied by rituals. Similarly, specific rules apply in logging the trees. Conservation efforts have been developed by local people with the help of NGOs and the government. However, people still need the help of scientific knowledge to use their biodiversity efficiently and sustainably.

V. ACKNOWLEDGEMENT

We acknowledge the Lembaga Penelitian dan Pengabdian Pada Masyarakat (LPPM) UIN Sunan Kalijaga for its generous funding so that this study could be carried out. We also thank the leaders of ethnic groups in Lambanapu, Wunga, Prailiu and Praiyawang, as much as we thank our respondents and our translators, Mr. Elton and Mr. Cornelis.

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