

Bima Traditional House Ethnobotany: *Uma Lengge*

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Abstract: Ethnobotany is a science that explains the knowledge of traditional communities on the use of plants to support their lives. One of the uses of plants for traditional building materials can be seen in the *Uma Lengge* building which is a traditional building located in the Wawo District, Bima Regency, West Nusa Tenggara. This building used to function as a residence for the *Mbojo* tribe. However, along with the development of the times, the function of the building has been transferred only as a place to store rice. This research aims to analyze the types of constituent plants and explore information about the local wisdom contained in *Uma Lengge's* architecture. This research type is qualitative using descriptive methods and plant anatomy approaches. Data collection is done using observations, interviews, and documentation. The selection of informants used the snowball sampling method. Based on the results of the study 7 types of plants were used as constituents for the construction of traditional *Uma Lengge* houses in Maria Village, teak (*Tectona grandis* Lf.), areca nut (*Areca catechu* L.), coconut (*Cocos nucifera* L.), banyan (*Ficus benjamina* L.), bamboo (*Gigantochloa atter* Kurz.), hibiscus (*Hibiscus tiliaceus* L.), and *ndolo* (*Imperata conferta* (J.Presl) Ohwi). The local wisdom contained in *Uma Lengge* architecture is still being applied by the people of Maria Village for generations which include customs, and the preservation of annual traditions or rituals that have good values to be passed down.

Keywords: Ethnobotany; Maria Village; Traditional Houses; *Uma Lengge*.

Introduction

Traditional houses are generally built without the support of building theory or principles, adapting to the climate and environment, built jointly (mutual cooperation) and adapting to the capabilities of the community (economy and technology), and utilizing natural materials. local. Man understands that they will continuously interact and each other depending on nature (Junaidin, et al., 2020). According to Sarwit Sarwono, et al. 2005 (in Nursugiharti, 2020) a traditional house is a place to live that is inhabited by the nuclear family and/or extended family located in a village or hamlet, made of wood with tin roofs/shingles or tiles having a frame structure, roof shape, and spatial layout tend to be standard.

Wisdom locally created consequence exists attitude and behavior public in interaction with nature and the environment. kindly etymology, wisdom local (*local*

wisdom) consists of two words, viz wisdom (*wisdom*) and local (*local*) so wisdom local is often conceptualized as policy local (*local wisdom*), knowledge local knowledge, and intelligence local (*local genius*) (Njatrijani, 2018). Ethnobotany is discipline knowledge that has cohesiveness/relationship or interaction between plants certain with group society (Bria & Binsasi, 2020). Field so-called research with ethnobotany investigates How man interacts with plants in their environment (Helmina & Yulianti, 2021). Thus, ethnobotany will benefit double, because besides being beneficial for humans and the environment, it will be beneficial for the protection of knowledge through the protection of species plants used.

Management source Power is the natural environment that exists in the Bima community which in this case is better known as the *Mbojo Tribe* which can be seen with existing building houses in traditional the area.

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The traditional house of the Mbojo tribe, known as *Uma Lengge*, is located in one of the villages in Bima Regency, West Nusa Tenggara. The structure of the building was built traditionally and is estimated to have existed from the 12th century AD until 1960. Apart from being a place for the community to live in, the *Uma Lengge* building also functions as a storage place for rice produced on agricultural land and plantations (Nurhafni, 2017).

Uma Lengge is made of derived components from the source power forest. Remember concern Wawo, which is an area of hills with diverse vegetation, source Power This is easily accessed. Election use of vegetation in architectural buildings in Bima became very important for guarding quality homes and avoiding weathering (Nurhafni, 2017). Every part that's inside *Uma Lengge* also has roles and functions separately, among other things place for keeping results harvest society, a place for doing activities social or culture in environment society, as well stated with symbols certain appropriate with the beliefs of the *Mbojo* Tribe (Maryanti, et al., 2021).

So far This is a related study with aspect botany form species plant constituents used at home traditional *Uma Lengge* so far Once done, however, research conducted Not yet used approach anatomy plant constituent of architecture House traditional. Remember material base making *Uma Lengge* is taken from the results of existing forests around the settlement society and age existing buildings, so needed information scientific about the type originating wood from the forest locally is Already available.

Method

Time and Place Study

Study This was held in January - February 2023 at Maria Village, subdistrict Wawo, Bima Regency.

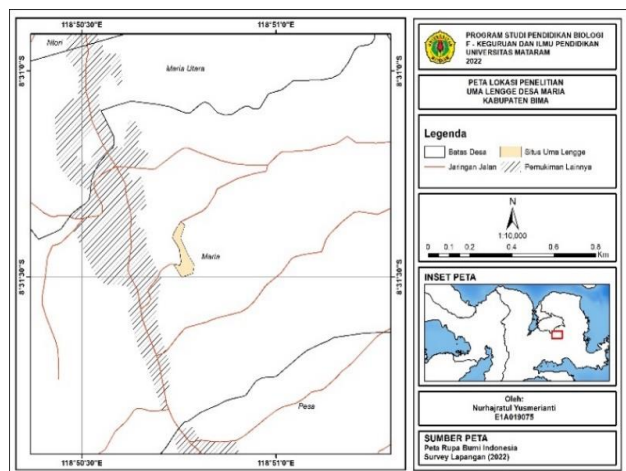


Figure 1. Location Location Study *Uma Lengge* in Maria Village

Tools and materials

Tools used in the study are an instrument semi-structured interview (guide question), tool writing, microscope, glass cover, glass objects, and tools documentation used to support the data recording process in the field such as recorder sound, and camera. Whereas materials used is material chemistry including alcohol (with a concentration of 30%) and samples of wood plant in the architecture building *Uma Lengge*.

Procedure Study

The stages in carrying out the study are 1). Determination of respondents, with the use technique of *snowball sampling* (Angelita et al., 2019). 2). Study of the anatomical structure of wood, through longitudinal or transverse incisions observed using a microscope (Arifin, 2019).

Draft Study

A draft study was done with compiled sheet observations used at the time the study was going on. Then he took wood on each element construction building *Uma Lengge* next observed anatomy with the microscope to make preparations fresh preparations which are preparations only used for necessity temporary and not for saving a period long time (Robika et al., 2023). In addition, if possible, macroscopic observations of plant anatomy are carried out based on easily observable general characteristics such as color, texture, hardness, and fiber direction (Andianto & Gusti, 2016).

Data Analysis

Research data in the form of qualitative data which is an ethnobotany constituent used in the architecture of *Uma Lengge* as well as wisdom local the community of Maria Village towards the *Uma Lengge* site.

Result and Discussion

Species Plant Compiler Construction Uma Lengge

Study results in This showing that amount species the number of plants used in drafting construction building *Uma Lengge* 7 species classified into 5 Families that is *Arecacea*, *Lamiaceae*, *Moraceae*, *Poaceae*, and *Malvaceae*. The most dominant part of the species used as material composer construction *Uma Lengge* is part stem used as beam cross, thrust bearing floors, poles, clamps beams, pegs, short plates, long plates, ribs, roofing wood, floors, boards isolation pest rats, roof (incl battens), breaker wind, and rigging. Then, the section leaf functions as closing the roof of the building which is characteristic of typical building *Uma Lengge* and the building around him.

Table 1. Species plant composer construction *Uma Lengge*

Name of Species / Family	Local Name / Indonesia	used part	Category Utilization
<i>Areca catechu</i> L. / Arecaceae	U'a / areca nut	Stem	Crossbeam (cross elbow).
<i>Cocos nucifera</i> L./ Arecaceae	Ni'u / Coconut	Stem	Crossbeam supporter pole, shovel bearing floor.
<i>Tectona grandis</i> L. f./ Lamiaceae	Teak	Stem	Pole, clamp beams, pegs, short plates, long plates, usuk, roofing wood.
<i>Ficus benjamina</i> L./ Moraceae	Due' / banyan	Stem	Insulation board pest mouse
<i>Gigantochloa atter</i> Kurz/ Poaceae	O'o / Bamboo	Stem	Floors, beams, (incl battens), horns/breaker wind, and lightning.
<i>Hibiscus tiliaceus</i> L./ Malvaceae	Wau/ Hibiscus	Stem	Ropespart connector between the bond roof covering
<i>Empire conferta</i> (J. Presl) Ohwi/ Poaceae	Ndolo	Leaf	Roof covering

Anatomy Composing Wood Plants Construction Uma Lenge

Observation results in structure anatomy in parts stem main wood composer construction *Uma Lengge*. Structure stem teak (*Tectona grandis* L. f.) has pores arranged almost entirely solitary. Whereas parenchyma enters to in type having paratracheal form sheath complete or no. Fingers on anatomy looked seen homogeneous (Fig. 2).

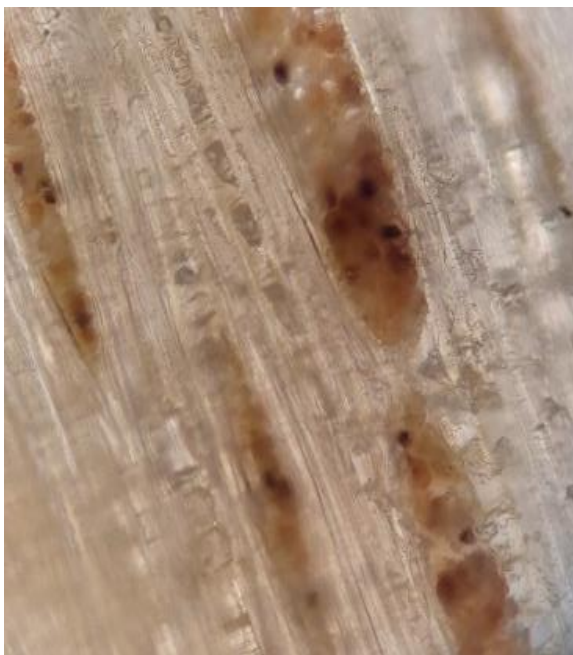
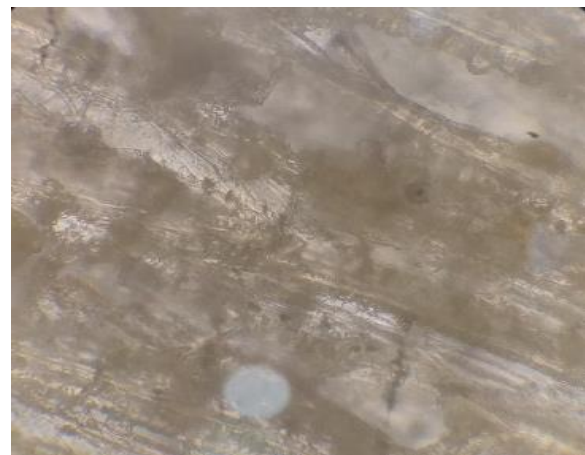


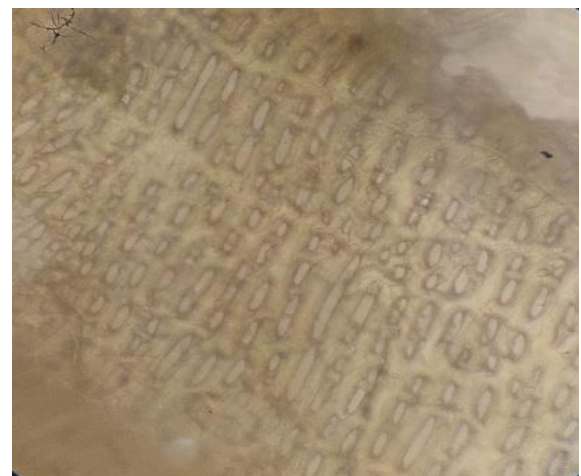
Figure 2. Structure Anatomy Teak Stem (*Tectona grandis* L.f.)

Anatomy areca nut (*Areca catechu* L.) can be seen in direction fiber straight, epidermal cells, tissue parenchyma own wall cells are thin and square long, there is collenchyma with type tangential (Fig. 3).



Picture 3. Structure Anatomy Stem Areca Nut (*Areca catechu* L.)

Network parenchyma function as network base structure anatomy stem coconut. It consists of cell polygonal thin walls until circular, network fiber, and a number bond Vascular scattered throughout the network parenchyma (Fig. 4).



Picture 4. Structure Anatomy Stem Coconut (*Cocos nucifera* L.)

Incision transverse from stem bamboo (*Gigantochloa atter* Kurz.) revealed epidermal tissue, cortex, bundles vessels made from fiber and phloem and metaxylem, as well sheath sclerenchyma.

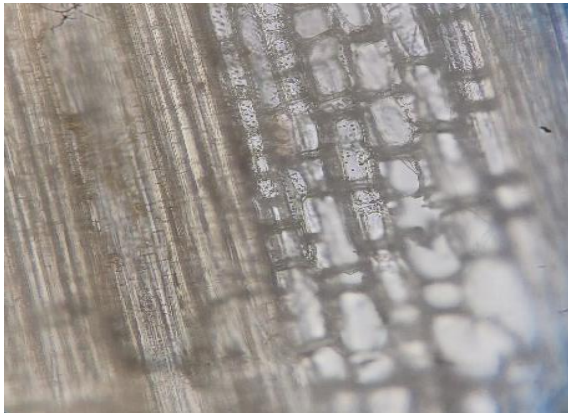


Figure 5. Structure Anatomy Bamboo Stem (*Gigantochloa atter* Kurz.)

Structure anatomy of the stem of the banyan that is There is an upper epidermis, palisade, and lower epidermis (Fig. 6).



Figure 6. Anatomical Structure of the Stem Banyan (*Ficus benjamina* L.)

History of Uma Lengge

Uma Lengge in the Bima language consists of two words, namely "house" is *Uma*, while the term for "cone" or "isosceles triangle" is *Lengge*, so these two words form the sentence "Uma Lengge" (Maryanti, et al., 2021). A traditional *Uma Lengge* building with architecture from the Ncuhi era of the *Mbojo* tribe, which has been around since the 12th century AD until 1960. It is known that the *Uma Lengge* building in Maria Village has existed since 1912 (Safitri, et al., 2021).

Before happening disaster fire in 1957, buildings the Still cared for by their respective owners, with repaired damaged components. However, in the same year, *Uma Lengge* made one in an area, and up to now no again

made it as occupancy but only as a barn or place to store material food.

It was recorded that before the fire occurred, the number of *Uma Lengge* buildings was 117 *Uma Lengge* units, currently there are only 13 *Uma Lengge* building units. Following this is the condition building *Uma Lengge*'s past (figure 6) and present (figure 7).



Figure 6. Conditions in 1933



Figure 7. Conditions in 2023

Architecture Uma Lengge

Based on observation direct as well as information obtained, on the site of the reserve culture *Uma Lengge*, there building that is covers *Uma Lengge*, *Uma Jompa*. Following a comparison between both.



Figure 8. Comparison building
a) *Uma Lengge*, b) *Uma Jompa*

Development process *Uma Lengge*, society local usually do preparation like Pray as well as determination day for development. However, in general, there are several sequences in the process of building *Uma Lengge*, the first being *panta pa'a* (signifying the start of building a building, both *Uma Lengge* and building a house), then carrying out a *roko* prayer (the prayer "bowing" which signifies the construction of a building and usually done by a *panggita* or a wood/building expert), and *kalondo/wonto pa'a* (indicating the completion of a *Uma Lengge* building).

After the construction process of *Uma Lengge* is completed, a thanksgiving prayer or a *Kalondo/wonto mpa.a* prayer will be performed with the aim that the

Uma Lengge building can be used according to its current function, namely to store agricultural and plantation products such as rice.

The *Uma Lengge* building has three main parts that make it up (Angelita et al., 2019). The first part (base) is usually called a *wombo*, in the form of a pit with a ground floor which was originally used as a kitchen (Figure 9. a). The second part, called *sarangge*, functions for customary activities such as deliberations and receiving guests, has no walls and is open (Figure 9. b). The third section, commonly known as the *taja* or the attic, was previously used as a bed, but now it has changed its function as a place for storing agricultural and plantation products (Figure 9. c).



Figure 9. Parts *Uma Lengge*

The third part main *Uma Lengge* building is composed of several elements such as;

- *wombo* part or foundation there is an element construction form:
 - a. *Pali* (foundation), works to sustain the burden as well as another part of the building.
 - b. *Ri'i*, (pole), functions as a retainer bang.
 - c. *Ceko* (beam cross), works amplifier between *ri'i* (pole) with *clamp* (clamp).
 - d. *Nggapi* (clamp), works as a clamp to four *ri'i* (pole) below in a manner that crosses.
 - e. *Wole* (peg), works as a liaison between element construction building.
- Second part or *sarangge* consists of element construction in the form of:
 - a. *Nggore* (usuk bearing floor), works as retainer/baseboard floor base for place sustain *sari* (board) which is on the 2nd floor.
 - b. *Sari* (board), works as a seat.
- *Taja* part or attic consists of arrangement elements in the form of:
 - a. *Lampoon*, works as a place to withhold pest mice as well as become a key earthquake resistance construction building.

- b. *Kende* (short plate), works function in holding each *ri'i* (pole).
- c. *Sembanta* (long plate) works for hold/hold between one pole with another pole.
- d. *Nggore* (usuk bearing floor), works as a base crutch or retainer *sari* (board) which is on the 3rd floor.
- e. *Tali Bawo* (roofing wood), works function as reinforcement (enforcer usuk) between end suck on left and right.
- f. *Ceko Panta* (beam cross), works as a benchmark in a barn so it can stand straight/solid.
- g. *Lama Boko* (base skewers), works as a benchmark for straightening usuk.
- h. *Boko* (usuk) works as binder battens.
- i. *Rira* (batten) works as a stand roofing material.
- j. *Wanga* (horn), the function also functions as a breaker of wind/thunder, as well as retaining and smoothing roofing material.

To clarify parts of every element of construction, the following Illustration of the construction building *Uma Lengge* (fig. 10):

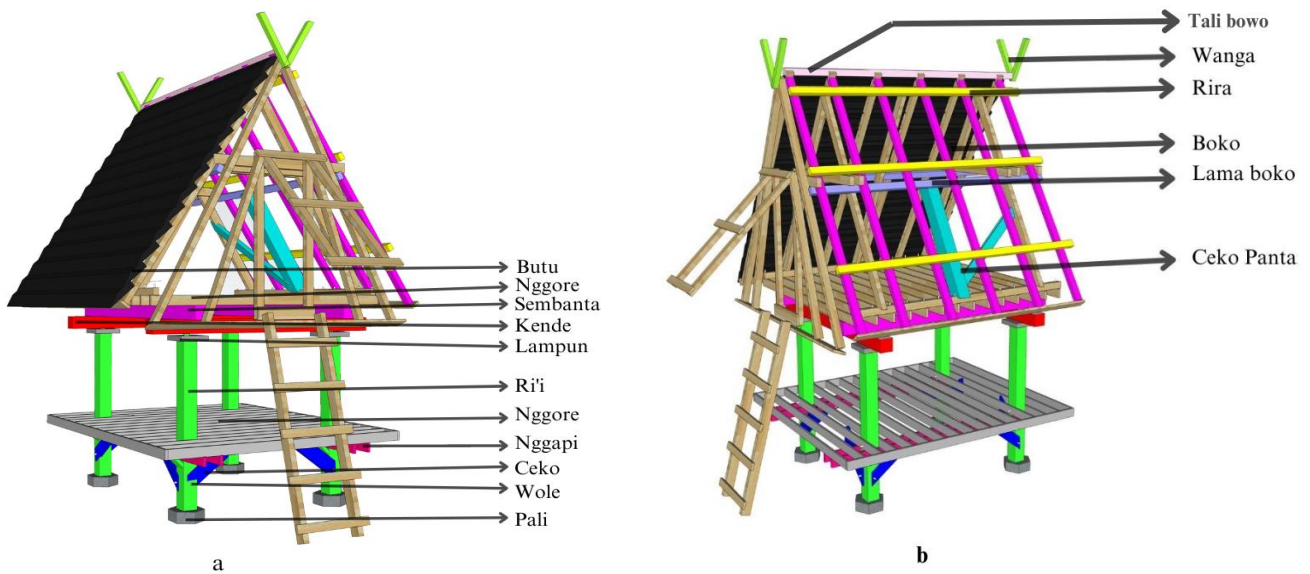


Figure 10. Construction *Uma Lenge*
Tendency: a. Looks front, b. Looks side

Uma Lenge Site Layout

The location of the *Uma Lenge* building complex in Maria Village (Fig. 11) basically has several considerations such as the placement of *Uma Lenge* facing the qibla direction, the distance of the placement which is far enough from the settlement in order to avoid fires, the *Uma Lenge* area should also not be overgrown or planted large trees with the aim of not causing damage to *Uma Lenge*. In general, people's concern for safety, security, and comfort influences the design or placement of *Uma Lenge*. On this basis, there are moral standards and communal laws that must be followed.



Figure 11. *Uma Lenge* Site Layout

Traditions and Culture of the Community of Maria Village

Custom is a manifestation of culture because it is a complex system of beliefs, ideals, standards, conventions, and laws. Culture is an abstract concept

that exists in the human brain and supports this civilization (Fanida, 2018).

The *ampa fare* tradition is one that is still routinely carried out in Maria Village, Wawo district, as an expression of gratitude to God Almighty. The word *ampa*, means "raising" or "lifting" something up, and the term "fare" means "rice" or "crops" (Fig. 12). This is often done after the main harvest (Naim, 2021).



Figure 12. Procession *ampa fare*

Aspect Botany and Conservation Plant Compiler Architecture *Uma Lenge*

The results of observations of the plant species making up the *Uma Lenge* construction show that the plants of each species used have their own characteristics, namely:

- Arecaceae family, namely areca nut (*Areca catechu* L.) and coconut (*Cocos nucifera* L.) species which have a good structure and are strong and belong to durable

class III, if they are located in a location that is always exposed to wind, weather, far from the sea, and has sufficient air access (Kusyanto, 2015). Coconut wood (*Cocos nucifera* L.) grows in coastal areas, with a height ranging from 15 - 40 m with a trunk diameter of 0.25 - 0.40 m. At the age of 3-4 years, the circle on the trunk does not enlarge anymore because the coconut tree does not have a cambium, so it cannot experience secondary growth. Every year, coconut trees increase in height by 1 - 1.5 m for young plants, 0.4 - 0.5 m for mature plants, and 0.1 m for old plants (Harsono, 2011).

- The Lamiaceae family, namely the species of teak plant (*Tectona grandis* L.f.) in which teak wood has a combination of good properties resulting in long-lasting teak stems and a natural durability value considering that teak is classified as durable class II (Candiana, et al., 2019). Teak trees can grow up to 30-35 m high on thick and fertile soils. It also has a rounded crown, cylindrical stem, branch-free stem height between 10-20 m, often grooved on the stem. Bark is 3 mm thick on young plants and can reach 0.5 - 0.7 cm on old plants, has a light gray-brown color (Fauzi, et al., 2020).
- The Moraceae family, namely the banyan plant species (*Ficus benjamina* L.), where this wood belongs to the durable class IV (Muslich & Rulliaty, 2013). Even though it has poor durability and hardness, local people still use banyan wood as a rat insulating board, considering that the wood is considered light. *Ficus benjamina* L. is one of the plants from the *Moraceae* family with tree growth that can reach a height of up to 40-50 m with a trunk diameter of 100-190 cm and is easy to grow in various land conditions, including dry land. In addition, *Ficus benjamina* L. is a fast-growing plant with a growth rate of 65 mg-1/day (Krisdianto & Balfas, 2016).
- The Poaceae family with ater bamboo species (*Gigantochloa atter* Kurz.) and *ndolo* (*Imperata conferta* (J.Presl) Ohwi.) which are used as construction materials that are known for their elastic properties so that they are resistant to earthquake shocks and are easily renovated if damage occurs (Nugroho, et al., 2022). Ater bamboo (*Gigantochloa atter* Kurz.) or what is often called ater bamboo has bright green to dark green stems and a diameter of about 5 - 10 cm, a segment length of about 40 - 50 cm with a stem height of up to 22 m (Belatrix, et al., 2022).
- Malvaceae family with hibiscus or new plant species (*Hibiscus tiliaceus* L.) where the tree trunks are used as rope, considering that hibiscus trees function as reinforcement in composites because hibiscus skin fiber has a continuous fiber structure and a strong natural weave (Nurudin, 2011), and, hibiscus wood

fiber is known to contain low lignin (Aulya, et al., 2020).

Many plant species have been used as planks since ancient times, and many local people continue to do so today. This can be seen from the main materials used in the construction process of *Uma Lengge* where almost 100% use natural materials in the form of old wood that is more than 50 years old as the building blocks of *Uma Lengge*. However, one of the obstacles in using wood or bamboo species as construction or building materials is that they are susceptible to attack by wood-destroying organisms including termites, dry sawdust, and fungi, which results in a relatively short service life. Considering that wood is used as a building material, it requires wood that has high mechanical properties or strength and durability (Alex & Winarni, 2020). So, to solve this problem, individuals usually opt for conventional methods like soaking and drying.

Conservation of plants such as teak (*Tectona grandis* L.f.), areca nut (*Areca catechu* L.), coconut (*Cocos nucifera* L.), banyan (*Ficus benjamina* L.), and others is still carried out by the community. Replanting is usually done in forests, or gardens so that raw materials are still available when needed. The replanting of plants used as building materials for the construction of *Uma Lengge* is only one aspect of community conservation efforts, the other being environmental protection. The form of local wisdom regarding conservation aspects in protecting the environment carried out by the Bima tribe is "parafu" (Maryanti, et al. 2021).

Based on the results of observations in the field, the problem currently being faced by the community is *ndolo* (*Imperata conferta* (J.Presl) Ohwi.) which is used for roof covering material which is very difficult to find because the community has not planted anything specifically. This results in when the roof is damaged it will take a very long time to be replaced and repaired. As a result of the scarcity of *ndolo* (*Imperata conferta* (J.Presl) Ohwi.) people have to buy it and look for it elsewhere.

Thus, the solutions to overcome these problems are 1) Inviting the local community to maintain the availability of the main raw materials for *Uma Lengge* construction, 2) establishing cooperative relationships with related parties such as building owners in the *Uma Lengge* complex, local government and the central government or local cultural services to be able to conduct outreach to the public regarding the preservation of plants which are an important component in *Uma Lengge*.

Conclusion

The conclusion from the study are: (1) There are 7 species of plants such as areca nut (*Areca catechu* L.), coconut (*Cocos nucifera* L.), teak (*Tectona grandis* Lf),

banyan (*Ficus benjamina* L.), (*Gigantochloa atter* Kurz.), hibiscus (*Hibiscus tiliaceus* L.) and ndolo (*Imperata conferta* (J. Presl) Ohwi.) belonging to into the 5 families used as composer construction House traditional *Uma Lengge*; (2) Utilization of plant species used in the construction of the *Uma Lengge* traditional house as cross beams, roof beams, pillars, beam clamps, pegs, short plates, long plates, roof beams, floors, rat insulating boards, roofs (including battens), windbreakers, rigging as well as additional constructions such as windbreakers. Thus, efforts are made to conserve the plant species used in the development of *Uma Lengge*, especially for species whose numbers are decreasing; (3) Residents of Maria Village have used local wisdom found in *Uma Lengge* architecture for several decades which consists of various knowledge related to the development process, *Uma Lengge* architecture, socio-cultural aspects, and conservation aspects which have good values to be passed down, as well as efforts in preserving the environment.

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Author Contributions

Nurhajratul Yusmerianti conceptualized research ideas, methodological designs, data analysis, management, and coordination responsibilities. Ida Mareta conducted research and process investigations, and literature reviews. Khairuddin, and I Gde Mertha critical feedback on the manuscript. All authors read and approved the final version of the manuscript.

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Conflicts of Interest

The author declares no conflict of interest. Funders have a role in research design; in the collection, analysis, or interpretation of data; in scriptwriting; or in the decision to publish the results.

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