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ANDI ABIDAH, ST, MT UNM &lt;andi.abidah@unm.ac.id&gt;

19 June 2021 at 15:14

To: salvatore.lorusso@unibo.it

Dear Editor Journal Conservation Science in Cultural Heritage

I am Andi Abidah from south Sulawesi Indonesia, interest submit a paper in your journal. my research about **healthy homes of the Ammatoa Kajang Indigenous people.**

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**Universitas Negeri Makassar**



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**Salvatore Lorusso** <salvatore.lorusso@unibo.it>  
To: "andi.abidah@unm.ac.id" <andi.abidah@unm.ac.id>

21 June 2021 at 16:24

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As you will see, the Journal website, available at: <https://conservation-science.unibo.it/> provides the various information on how to prepare your paper; after sending your submission the paper is evaluated - if it passes this preliminary step, according to indications that will subsequently be provided, the Author must send the publisher, L'Erma di Bretschneider, the sum to cover the APC ( Author Processing Charge) which is 300.00 euros +VAT.

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ANDI ABIDAH, ST, MT UNM &lt;andi.abidah@unm.ac.id&gt;

20 July 2021 at 19:54

To: Salvatore Lorusso &lt;salvatore.lorusso@unibo.it&gt;

Dear Editor in Chief

Thank you for your email and advice. My paper about **Healthy Homes of the Ammatoa Kajang Indigenous People** is in the attachment file.

Looking forward to your response.

Thank you Very much.

**Stay safe and healthy!**

**Dr.techn. Andi Abidah, S.T, M.T**

**Head of Architecture Study Program**

**Faculty of Engineering**

**Universitas Negeri Makassar**

**South Sulawesi, Indonesia**

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**Healthy Homes of the Ammatoa Kajang Indigenous People.docx**

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# Healthy Homes of the Ammatoa Kajang Indigenous People

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## **Abstract**

Even today, there are indigenous peoples communities in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed by taking into consideration where and how their houses are built and the effects of their dwellings on the physiology of the occupants as well the social, spiritual and cultural relations within their community, integrated with their system of beliefs and their environment. One of these indigenous communities, who lives this way and has shunned all forms of modernization, is the Ammatoa Kajang who inhabit a remote area of South Sulawesi province. Their traditional homes that are built even today adhere to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community

**Keywords:** architecture, anthropology, dwellings, healthy home, indigenous people, physiology, traditional houses.

## **1. Introduction**

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO) where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live and their physical and mental health has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment as well as its maintenance. Further, Rudi (Rudi Gunawan, 2009) states that a healthy house has clean water available with good plumbing and sanitation to deal with clean and dirty water, is well lit and has good cross ventilation. The temperature and humidity of the room can affect the comfort and health of the occupants. Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C – 30°C with humidity between 40% and 70% to ensure the comfort of its occupants and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years like the Ammatoa Kajang indigenous peoples that has separated itself from all forms of modernization.

The Ammatoa Kajang reside on their ancestral lands of 22689.59 hectares<sup>1</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as *rambang seppang* – that covers over

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<sup>1</sup> The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulsel

552 hectares and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area) also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life as set by their oral precepts, sayings and principles collectively referred to as the *Pasang ri Kajang* while residents of the Kajang Luar have embraced most if not all forms of modernity.

The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must be used, how rituals and traditions should be practiced and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built using informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar and Mandar indigenous peoples of Sulawesi island having floors raised about 180 – 200 centimetres from the ground (Waterson 1990). The “H-shaped” frames for the structure of Bugis and Makassar houses that do not use pegs or nails in their construction, as (Pelras 1985) explains, are commonly found throughout Southeast Asia.

However, it is (Rapoport n.d.) who observes that tradition, custom and culture influence the Kajang Dalam houses’ orientation as well as house shape and other aspect of house design. Passed down from generation to generation every part of the house including certain elements that are applied has been given meaning to even recently built houses in the Kajang Dalam customary area. The form of customary Ammatoa Kajang house is divided vertical into three parts, as (Erawati Lewa 2018) explains, namely, the upper level or attic, locally referred to as *pammakkang / rakkeang* below which is the body of the house called *kale ballak*, and then the open space beneath the house which is called *awasao / siring*. See the figure 1. The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as living space for the occupants to carry out their daily activities while the open area under the house is used to keep agricultural tools as well as livestock such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to (Palemmui Nadji 2006) also consist of three vertical parts namely, the attic, the body of house and under the house. The attic (*rakkeang*) is the upper level which the Bugis indigenous people consider to be a sacred space; the middle part body of the house (*alebola*) is used as an area to carry out daily activities, and lower part (*wasaubola*) is considered to be dirty space.

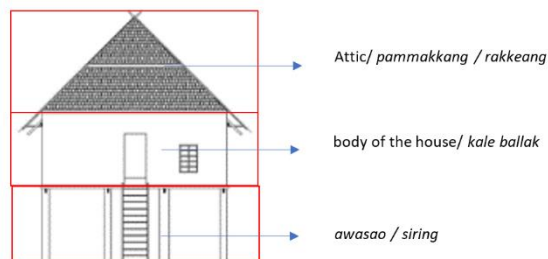


Figure 1: vertical parts of the home

Sketch by Andi Abidah 2020

A house’s orientation determines the amount of sunlight and air coming into the house as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses’ traditional structure, (Osman 2000) notes that their houses are now oriented to the road while the Kajang Dalam maintain their houses’ orientation facing west with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider that will ensure a healthy home include building materials, room size, and waste disposal. Moreover, (Gallahue, D.L., dan Ozmun 1998) observes that temperature, climate and ceiling height also physiologically impact the occupants. Such careful consideration of these can be seen in Kajang Dalam homes.

## 2. Objective

The deep mental, spiritual and cultural connection the Kajang Dalam have with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these homes influence the physiology of their occupants.

### 3. Methods

This research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour as highlighted by (Oliver 1997). This is so that the extent of dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng of the Kajang Dalam.

This study is the result of the joint research carried out by three lecturers with expertise in three lecturers with expertise in differing fields of study namely cultural architecture, occupational health and safety, and environmental architecture.

This research process began by conducting a literature study of academic research connected with the Kajang community. This was followed by conducting a field survey of ten objects of study, i.e. the houses, by sketching out drawings – as photography was strictly forbidden – and by collecting measurement of each house's dimensions. These were then transferred to the AutoCAD 2D application later. Interviews of the inhabitants of the houses as well as with community members were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions to the owners of the respective houses included the age of the house, the positions of the kitchen and stairs as well as room order along with their importance and usage. The data was then correlated, analysed and discussed.

### 4. Results

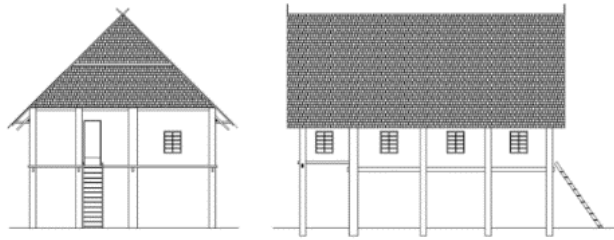
A sample of ten houses in the Kajang Dalam area were the research objects which are located in the hamlet of Benteng. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three lura by two latte with a tala-tala along the back (see figure 3) while two houses were slightly larger in size measuring 3 lura by three latte also with a tala-tala (see figure 4).

Generally, every house is designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats.

Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations that require them to maintain their simple life (see figure 4).



Figure 2. three lura-two latte plus tala-tala  
Sketch : Andi Abidah, 2020



**Figure 3.** three lura by three latte plus tala-tala  
Sketch: Andi Abidah, 2020



**Figure 4:** Traditional lamp (*pelita*: local language)  
Photographer : Andi Abidah 2020

## 5. Discussion

Indonesia's geographical position is on the equator so that every island of the archipelago experiences high rainfall and humidity, low wind speed and intense sun characteristic a tropical climate so that every customary dwelling requires a design that incorporates a good amount of ventilation to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors intoto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects, culturally distinct communities which the Ammatoa Kajang refer to in their language as *ilalang embayya* (inside the fenced area) also known as *rambang seppang* or *Kajang Dalam* area and the *ipantarang embayya* (outside the fenced area) also known as *rambang luara* or *Kajang Luar* area (Aminah 1989).

Those who live in the *Kajang Luar* area are effectively a buffer between those living in the *Kajang Dalam* area and the world as they are able to embrace modernity and yet maintain ties to their cultural heritage because they have chosen to only loosely follow a few of the *Pasang ri Kajang* customs. This can be seen by the *Kajang Luar* community's use of modern tools and equipment to cultivate their land, in the wearing modern clothing and in their houses which are often in appearance not much different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the *Kajang Luar*, as explained by (Abidah, Yahya, and Rauf n.d.), are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings.

On the other hand, tthe *Kajang Dalam* community's houses are built entirely out of natural materials This is in strict obedience to every precept of the *Pasang ri Kajang* which influences all aspects of daily life including the construction and placement of every thatched roofed wood and bamboo home within the environment.

### 5.1. Cultural Influences on Indigenous Dwellings

The Ammatoa Kajang community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in their sacred forest. Certain areas are allocated for the planting of trees to be used for firewood and construction while fruit bearing and other production trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals which is cultivated close to the house by the women. As a result, the Kajang Dalam area remains green and fresh. Nature is an ancestral heritage that needs both its quality and balance to be maintained. The resolute of the Kajang Dalam's community to preserve their forest and natural surroundings is the application of their firmness to the ancestral teachings called *Pasang ri Kajang* (Darmawan 2019) that promotes this balance so that this community always lives in comfort and harmony with the natural environment (Wiwik Wahidah Osman, Shirly Wunas 2016).

The houses built within the Kajang Dalam area are in strict adherence to all the customary rules including those that deal with all aspects of the form and elements of their stilt homes such as each house's size and orientation, the material that may be used for construction, the shape and position of the windows, the position of the kitchen, and the staircase. Even the placement of a house in the Kajang Dalam area and its construction are considered a ritualistic rite as (Sukman 1993) notes. All Kajang Dalam houses, as (Nurhayati 2000) observes, have small dimensions, are simple in form without any ornamentation and are constructed using similar materials in a standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

Traditional houses in Indonesia can be seen to have their designs and especially orientations influenced by Hindu and Islam as explained by (J.M.Nas 1998) Hindu practices forbid houses from being built facing the sunset as the sun is analogous to life. When Islam started spreading its influence – starting in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to (Abidah 2019), can also be found in the old settlement of the Soppeng-bugis tribe where houses formerly North-South oriented are now oriented to Mecca. However, from the 1970's onwards, new settlements were oriented to the roads.

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo topped with box gable roofs that have a 45 degree pitch covered with thatch which is much cooler than the zinc used as roofing in the Kajang Luar area. Generally, the walls and floors are constructed with a combination of wood and bamboo while some houses do not use any bamboo at all. The staircase to the front door, which is centered at the front of the house, is open to the elements so the wood used for stair construction is of noticeably better quality to withstand weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted length wise across the threshold called a *kappa-kappang*.

The ten objects of this study were similar in size and shape as they use anthropometry to set the dimensions of each house and use the terms *lura* for width and *latte* for length. Anthropometry is commonly used by many indigenous peoples. This can include, as (Oliver 1997) explain the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm as well as other parts of the body including the torso that are used as basic measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as (Zain 2012) states, are based on the human body to determine the height of doors, windows, fences and so on. Furthermore, Balinese house dimensions, as (Bidja 2000) states, use the human body to calculate the size and scale of buildings to ensure that a balance between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used (Abidah 2019). All the study objects also had a *tala-tala* which is a narrow extension along the back of the house of a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* with a *tala-tala* while two houses were wider by a third at three *lura* by three *latte* with a *tala-tala* along the rear as shown in figures 5,6,7 and 8.





Figure 5: Lura of house by Andi Abidah 2020

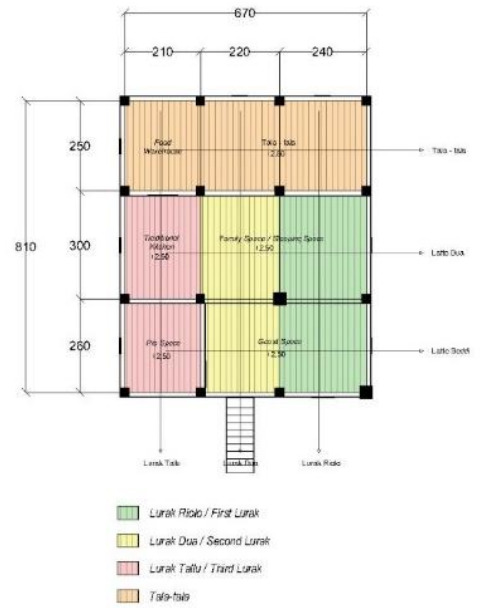


Figure 6. Floor plan of the lura and tala-tala by Andi Abidah 2020



Figure 7: Latte of the house roomplang by Andi Abidah 2020

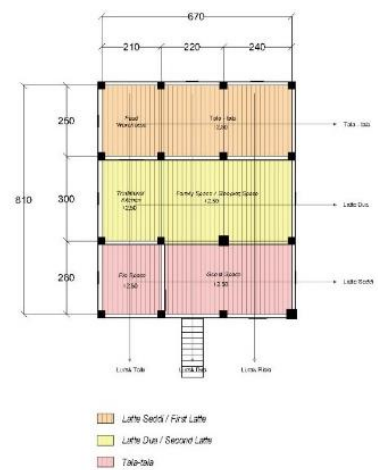


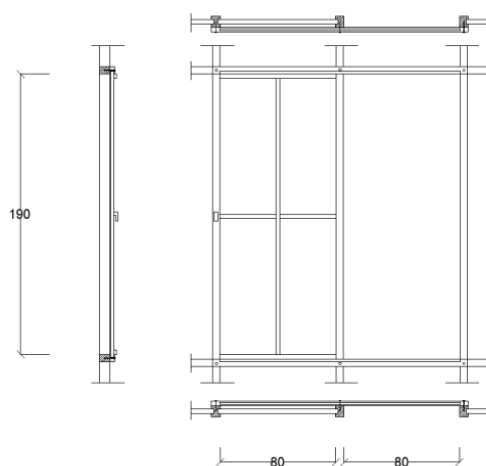
Figure 8. Latte and tala-tala in Sketch by Andi Abidah 2020

The placement of the kitchen is unusual and yet it has remained in this position unchanged for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura* of the first *latte* so that it is always visible to guests in the sitting room to the right of the front door as seen in the floor plans of figures 6 and 8. This indicates the openness of the occupants about their food as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones or sometimes simple furnaces are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, that also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container which is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash up before sleeping as well as a convenient place to urinate at night. By comparison, the kitchen of a Bugis house, as (Pelras 2004) explains, is located in last *lontang* in Bugis language or *lura* in Makassar Konjo, the language of the Kajang. It is rare to have the kitchen situated within the main part of the house in Indonesia as (Forshee 2006) verifies. This is because, Indonesians in remote areas still cook by traditional methods which produce smoke.

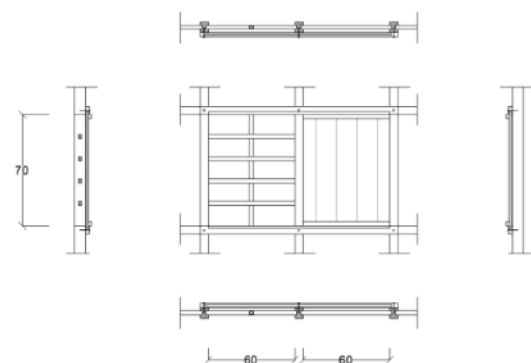
Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates while the *para-para* on the opposite side is used to the storage floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to (Abidah 2019), and are referred to as *tanre-tanreang* in Bugis. However, this element has been slowly disappearing.

## 5.2. Indigenous Techniques to Maximize Ventilation and Light

The customary rules concerning windows allows for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right (see figure 11). The number three is significant in Ammatoa Kajang culture so every house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size but their rectangular shape, style and material were uniform. All windows are fitted with wood bars as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in figures 9 and 10, is unique to Ammatoa Kajang dwellings.



**Figure 9.** Sliding window model  
Sketch by Andi Abidah 2020



**Figure 10.** Sliding window model  
Sketch by Andi Abidah 2020

Generally, the floor is constructed of wood and bamboo. Bamboo slats are used in the first and second latte while the *tala-tala* has a plank floor. The flooring throughout each house has approximately one centimetre gaps between each wooden plank and bamboo slat to allow air circulation even at night when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to (Chuki, Sarkar, and Kurar 2017), can be seen in traditional Thai houses that use bamboo, wood planks, and thatch the difference being that bamboo is used not only in the corridor of the house but also in roof construction to support the thatch.



**Picture 11:** Cross Ventilaton  
Sketch by Andi Abidah 2020

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, the density or distance between the dwellings and any other barriers such as vegetation that would decrease air quality and flow. The distance between houses is between three to five meters with well maintained foliage surrounding each house (Swasti 2016). Futhermore, (Dipl. Ing. Y.B Mangun Wijaya 1988) observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### **5.3. Indigenous Management of Clean and Black Water**

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water positioned at 5°19'27.7"S 120°17'56.5"E that serves three villages see figure 12. The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking.



**Figure 12** Source fresh water  
Source : Internet 2020

In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the house's left side, flows into a low area and seeps into the ground.

For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meter area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter dug 2 to 3 meters into the ground which is covered with two sizeable flat rocks placed with a gap between for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as (Boano et al. 2020) explains, which actually receives good marks in terms of environmental and energy profits when such processing systems are integrated into green structures.

## 6. Conclusion

Even though the Ammatoa Kajang indigenous community in the Kajang Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the *Pasang ri Kajang* together with the directives of their customary institutions that regulate the community's interactions with their environment and each other for their physical, mental and spiritual well-being. The Kajang Dalam residents have sustained a refreshing green environment that flows through their homes where they admit to feeling very comfortable.

## Acknowledgments

Thanks for Universitas Negeri Makassar give opportunities to us for making research in Kajang. Thanks also for the communities of Kajang specially Kajang Dalam.

## REFERENCES

Abidah, Andi. 2019. 'Nobel and Commoner Bugis Houses in the Regency of Soppeng South Sulawesi, Indonesia'. Vienna University of Technology.

Abidah, Andi, Muh Yahya, and Bakhrani A. Rauf. n.d. 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants'. 446–48.

Aminah, Sitti. 1989. Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang. Depatemen P & K Sulawesi Selatan.

Bidja, I. Made. 2000. Asta Kosala-Kosali Asta Bumi. PB.

Boano, Fulvio, Alice Caruso, Elisa Costamagna, Luca Ridolfi, Silvia Fiore, Francesca Demichelis, Ana Galvão, Joana Piseiro, Anacleto Rizzo, and Fabio Masi. 2020. 'A Review of Nature-Based Solutions for Greywater Treatment: Applications, Hydraulic Design, and Environmental Benefits'. *Science of the Total Environment* 711

Chuki, Sonam, Raju Sarkar, and Ritesh Kurar. 2017. 'A Review on Traditional Architecture Houses in Buddhist Culture'. *American Journal of Civil Engineering and Architecture* 5(3):113–23.

Darmawan, Iin Hardianti. 2019. 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba'. Universitas Islam Negeri Alauddin Makassar.

Dipl. Ing. Y.B Mangun Wijaya. 1988. Pengantar Fisika Bangunan. Penerbit Djambatan.

Erawati Lewa, Erni. 2018. 'Arsitektur Rumah Tradisional Suku Kajang Di Provinsi Sulawesi Selatan'. *Mozaik Humaniora* 18(80–92):1689–99.

Forshee, Jill. 2006. *Culture and Customs of Indonesia*. Culture an. London: British Library Cataloguing.

Gallahue, D.L., dan Ozmun, J. C. 1998. *Understanding Motor Development Infant Children, Adolescent, Adults*. USA : Mac Graw Hill Company.

J.M.Nas, Peter. 1998. 'The House in Indonesia Between Globalization and Localization'. *Bijdragen Tot de Taal-, Land- En Volkenkunde* 2:335–60.

Nurhayati. 2000. 'Karakteristik Rumah Tinggal Tradisional Kawasan Ammatoa Kajang'. UNHAS.

Oliver, Paul, ed. 1997. 'Theories and Principles'. Pp. 6–15 in *Encyclopedia of Vernacular Architecture of the World*. The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Chamridge University Press.

Osman, Wiwik Wahidah. 2000. 'Karakteristik Dan Aturan Adat Pada Tatanan Rumah Tinggal Dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.' Tesis Jurusan Teknik Arsitektur ITS. Surabaya.

Palemmui Nadji. 2006. *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar.

Pelras, Christian. 1985. 'Religion, Tradition and Dynamics of Islamization in South Sulawesi'. 29:107–35.

Pelras, Christian. 2004. 'Bugis and Makassar Houses Variation and Evolution'. Pp. 251–81 in *Indonesian houses*, edited by R. Schefold, G. Domenig, and P. J.M.Nas. Singapore: SUP Singapore University Press.

Rapoport, Amos. n.d. 'Culture , Architecture , and Design'.

Rudi Gunawan. n.d. *Rencana Rumah Sehat*. Kanisus.

Sukman. 1993. 'Arsitektur Vernakular Ammatoa Kajang Di Sulawesi Selatan'. Universitas Gaja Mada.

Swasti, Tathia Edra. 2016. 'Pengaruh Kerapatan Bangunan Pada Karakteristik Termal Rumah Tinggal Kampung Naga Terhadap Kenyamanan Penghuni'. *Jurnal Arsitektur, Bangunan, & Lingkungan* 5(2):83–90.

Waterson, Roxana. 1990. 'The Living House An Anthroponology of Architecture in South-EastAsia'. Oxford University Press Pte Ltd.

Wiwik Wahidah Osman, Shirly Wunas, Mimi Arifin. 2016. 'Struktur Kawasan Permukiman Ammatoa

Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang'. *Iplbi* (1):127–30.

Zain, Zairin. 2012. 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan'. Technische Universität Wien.



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## paper submission Conservation Science in Cultural Heritage

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Salvatore Lorusso <salvatore.lorusso@unibo.it>  
To: "ANDI ABIDAH, ST, MT UNM" <andi.abidah@unm.ac.id>

23 July 2021 at 01:57

Dear Dr. Andi Abidah,

I had already pointed out the need to follow the established Author Guidelines very carefully for the layout of your paper, which you can find and consult online.

More in detail, it is essential to revise the points I have indicated below to complete the work done with your co-authors:

- eliminate the superscript numbers that appear after the names of the authors and before the names of the institutions;
- write the names of the institutions, the city and the country without the address;
- the corresponding author and e-mail go to the bottom of the page;
- the summary must be placed at the end of the paper after the biographical notes;
- keywords must not exceed 5 in number;
- notes must be at the end of the work;
- the captions/legends for the figures must be legible using appropriate characters;
- the figures must be enlarged and have optimum definition;
- bibliographic references [1], [2], etc. must be placed at the right point in the text and then listed in full at the end of the paper;
- figure numbers must also be cited at the right point in the text (Figure 1, Figure 2, etc.) close to where the figures themselves appear;
- at the end of the paper the order of layout is: text (etc.), notes, acknowledgements, references, biographical notes of each author (missing at present), summary.

These points had already been made clear previously and they shall not be repeated.

Best wishes  
Salvatore Lorusso  
Editor-in-Chief



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**paper submission Conservation Science in Cultural Heritage**

ANDI ABIDAH, ST, MT UNM <andi.abidah@unm.ac.id>

2 August 2021 at 02:16

To: Salvatore Lorusso <salvatore.lorusso@unibo.it>

Dear Salvatore Lorusso  
Editor-in-Chief

Thank You for your email and correction, the paper layout is already improving.  
You can find the paper in the attachment file.  
Thank you very much

Stay safe and healthy,

**Dr.techn. Andi Abidah, S.T., M.T**

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# Healthy Homes of the Ammatoa Kajang Indigenous People

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## ***1. Introduction***

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO) where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live and their physical and mental health has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment as well as its maintenance. Further, Rudi [1] states that a healthy house has clean water available with good plumbing and sanitation to deal with clean and dirty water, is well lit and has good cross ventilation. The temperature and humidity of the room can affect the comfort and health of the occupants.

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Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C –30°C with humidity between 40% and 70% to ensure the comfort of its occupants and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years like the *Ammatoa Kajang* indigenous peoples that has separated itself from all forms of modernization.

<sup>2</sup>The Ammatoa Kajang reside on their ancestral lands of 22689.59 hectares<sup>1</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as rambang seppang – that covers over 552 hectares and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area) also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life as set by their oral precepts, sayings and principles collectively referred to as the *Pasang ri Kajang* while residents of the Kajang Luar have embraced most if not all forms of modernity.

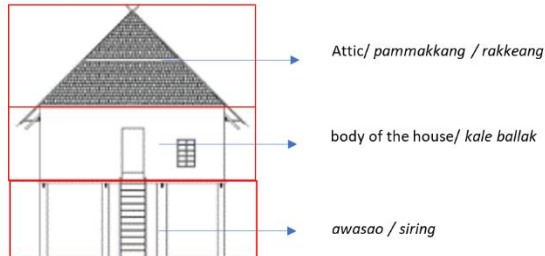
The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must used, how rituals and traditions should be practiced and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built using informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar and Mandar indigenous peoples of Sulawesi island having floors raised about 180 – 200 centimetres from the ground [2]. The “H-shaped” frames for the structure of Bugis and Makassar houses that do not use pegs or nails in their construction, as [3] explains, are commonly found throughout Southeast Asia.

However, it is [4] who observes that tradition, custom and culture influence the Kajang Dalam houses's orientation as well as house shape and other aspect of house design. Passed down from generation to generation every part of the house including certain elements that are applied has been given meaning to even recently built houses in the Kajang Dalam customary area. The form of costumery Ammatoa Kajang house is divided

vertical into three parts, as [5] explains, namely, the upper level or attic,

locally referred to as *pammakkang / rakkeang* below which is the body of the house called *kale ballak*, and then the open space beneath the house which is called *awasao / siring*. See (the figure 1).



**Figure 1: vertical parts of the home, Sketch by Andi Abidah 2020**

The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as living space for the occupants to carry out their daily activities while the open area under the house is used to keep agricultural tools as well as livestock such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to [6] also consist of three vertical parts namely, the attic, the body of house and under the house. The attic (*rakkeang*) is the upper level which the Bugis indigenous people consider to be a sacred space; the middle part body of the house (*alebola*) is used as an area to carry out daily activities, and lower part (*wasaubola*) is considered to be dirty space.

A house's orientation determines the amount of sunlight and air coming into the house as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses' traditional structure, [7] notes that their houses are now oriented to the road while the Kajang Dalam maintain their houses' orientation facing west with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider that will ensure a healthy home include building materials, room size, and waste disposal. Moreover, [8] observes that temperature, climate and ceiling height also physiologically impact the occupants. Such careful consideration of these can be seen in Kajang Dalam homes.

## 2. Objective

The deep mental, spiritual and cultural connection the Kajang Dalam have with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these homes influence the physiology of their occupants.

### 3. Methods

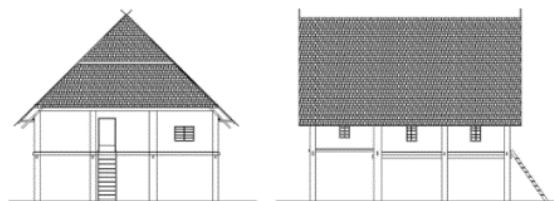
This research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour as highlighted by [9]. This is so that the extent of dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng of the Kajang Dalam.

This study is the result of the joint research carried out by three lecturers with expertise in three lecturers with expertise in differing fields of study namely cultural architecture, occupational health and safety, and environmental architecture.

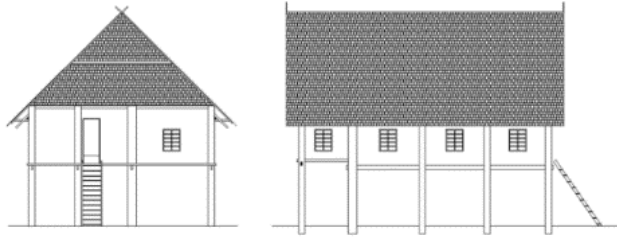
This research process began by conducting a literature study of academic research connected with the Kajang community. This was followed by conducting a field survey of ten objects of study, i.e. the houses, by sketching out drawings – as photography was strictly forbidden – and by collecting measurement of each house's dimensions. These were then transferred to the AutoCAD 2D application later. Interviews of the inhabitants of the houses as well as with community members were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions to the owners of the respective houses included the age of the house, the positions of the kitchen and stairs as well as room order along with their importance and usage. The data was then correlated, analysed and discussed.

### 4. Results

A sample of ten houses in the Kajang Dalam area were the research objects which are located in the hamlet of Benteng. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three *lura* by two *latte* with a *tala-tala* along the back (see figure 2) while two houses were slightly larger in size measuring 3 *lura* by three *latte* also with a *tala-tala* (see figure 3).



**Figure 2.** three *lura*-two *latte* plus *tala-tala*, sketch : Andi Abidah, 2020



**Figure 3.** *three lura by three latte plus tala-tala, sketch: Andi Abidah, 2020*

Generally, every house is designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats. Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations that require them to maintain their simple life (see figure 4).



**Figure 4:** *Traditional lamp (pelita: local language, Photographer : Andi Abidah 2020*

## 5. Discussion

Indonesia's geographical position is on the equator so that every island of the archipelago experiences high rainfall and humidity, low wind speed and intense sun characteristic a tropical climate so that every customary dwelling requires a design that incorporates a good amount of ventilation to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it

is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors intoto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects, culturally distinct communities which the Ammatoa Kajang refer to in their language as *ilalang embayya* (inside the fenced area) also known as *rambang seppang* or *Kajang Dalam* area and the *ipantarang embayya* (outside the fenced area) also known as *rambang luara* or *Kajang Luar* area [10].

Those who live in the *Kajang Luar* area are effectively a buffer between those living in the *Kajang Dalam* area and the world as they are able to embrace modernity and yet maintain ties to their cultural heritage because they have chosen to only loosely follow a few of the *Pasang ri Kajang* customs. This can be seen by the *Kajang Luar* community's use of modern tools and equipment to cultivate their land, in the wearing modern clothing and in their houses which are often in appearance not much different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the *Kajang Luar*, as explained by [11], are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings.

On the other hand, the *Kajang Dalam* community's houses are built entirely out of natural materials This is in strict obedience to every precept of the *Pasang ri Kajang* which influences all aspects of daily life including the construction and placement of every thatched roofed wood and bamboo home within the environment.

### **5.1. Cultural Influences on Indigenous Dwellings**

The Ammatoa Kajang community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in their sacred forest. Certain areas are allocated for the planting of trees to be used for firewood and construction while fruit bearing and other production trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals which is cultivated close to the house by the women. As a result, the *Kajang Dalam* area remains green and fresh. Nature is an ancestral heritage that needs both its quality and balance to be maintained The resolute of the *Kajang Dalam*'s community to preserve their forest and natural surroundings is the application of their firmness to the ancestral teachings called *Pasang ri Kajang* [12] that promotes this balance so that this community always lives in comfort and harmony with the natural environment [13].

The houses built within the Kajang Dalam area are in strict adherence to all the customary rules including those that deal with all aspects of the form and elements of their still homes such as each house's size and orientation, the material that may be used for construction, the shape and position of the windows, the position of the kitchen, and the staircase. Even the placement of a house in the Kajang Dalam area and its construction are considered a ritualistic rite as [14] notes. All Kajang Dalam houses, as [15] observes, have small dimensions, are simple in form without any ornamentation and are constructed using similar materials in a standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

Traditional houses in Indonesia can be seen to have their designs and especially orientations influenced by Hindu and Islam as explained by [16]. Hindu practices forbid houses from being built facing the sunset as the sun is analogous to life. When Islam started spreading its influence – starting in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to [17], can also be found in the old settlement of the Soppeng-bugis tribe where houses formerly North-South oriented are now oriented to Mecca. However, from the 1970's onwards, new settlements were oriented to the roads.

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo topped with box gable roofs that have a 45 degree pitch covered with thatch which is much cooler than the zinc used as roofing in the Kajang Luar area. Generally, the walls and floors are constructed with a combination of wood and bamboo while some houses do not use any bamboo at all. The staircase to the front door, which is centered at the front of the house, is open to the elements so the wood used for stair construction is of noticeably better quality to withstand weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted length wise across the threshold called a *kappa-kappang*.

The ten objects of this study were similar in size and shape as they use anthropometry to set the dimensions of each house and use the terms *lura* for width and *latte* for length. Anthropometry is commonly used by many indigenous peoples. This can include, as [9] explain the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm as well as other parts of the body including the torso that are used as basic measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as [18] states, are based on the human body to determine the height of doors, windows, fences and so on. Furthermore, Balinese house dimensions, as [19] states, use the human body to calculate the size and scale of buildings to ensure that a balance

between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used [17]. All the study objects also had a *tala-tala* which is a narrow extension along the back of the house of a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* with a *tala-tala* while two houses were wider by a third at three *lura* by three *latte* with a *tala-tala* along the rear as shown in (figures 5,6,7 and 8).



Figure 5: *Lura* of house by Andi Abidah 2020

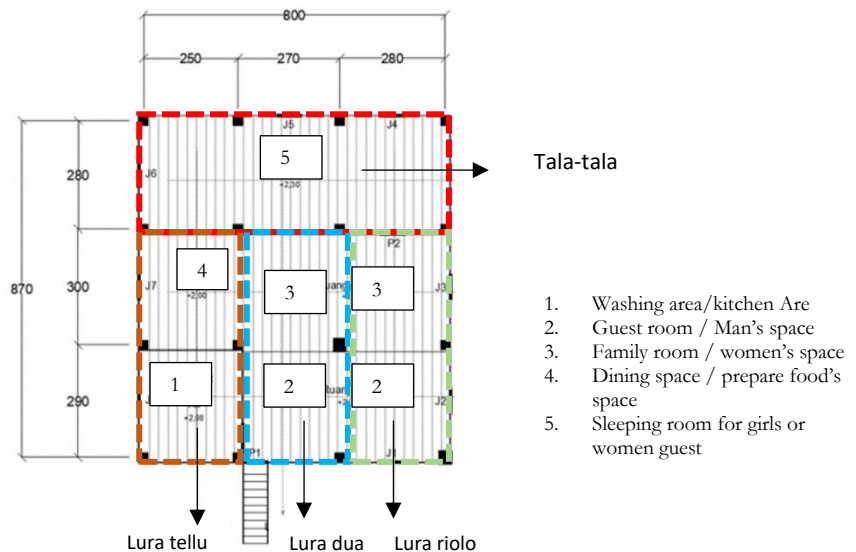
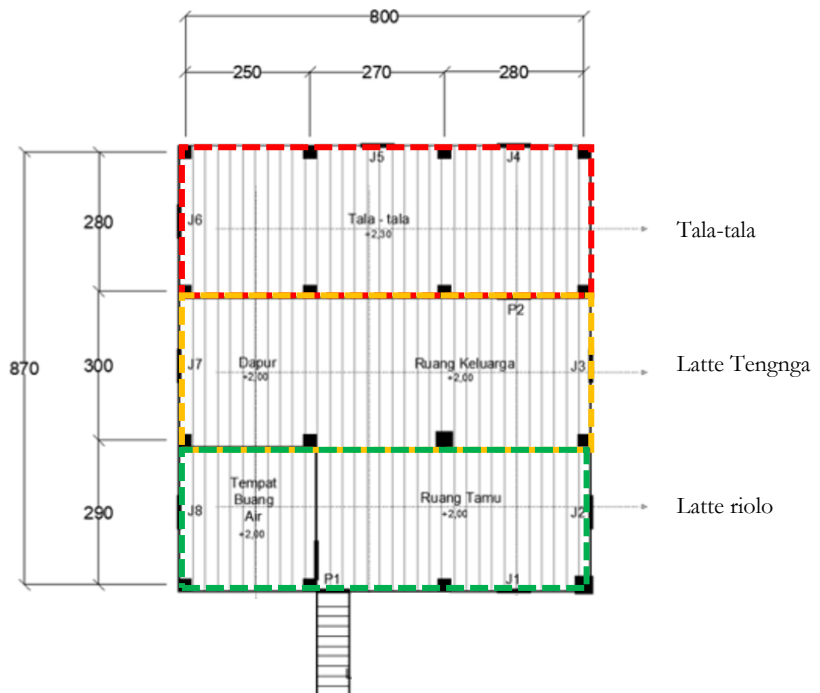


Figure 6. Floor plan of the *lura* and *tala-tala* by Andi Abidah 2020





**Figure 7:** Latte of the house, by Andi Abidah 2020



**Figure 8.** Latte and tala ala in room plan, sketch by Andi Abidah 2020

The placement of the kitchen is unusual and yet it has remained in this position unchanged for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura* of the first latte so that it is always visible to guests in the sitting room to the

right of the front door as seen in the floor plans of (figures 6 and 8). This indicates the openness of the occupants about their food as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones or sometimes simple furnaces are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, that also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container which is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash up before sleeping as well as a convenient place to urinate at night. By comparison, the kitchen of a Bugis house, as [20] explains, is located in last *lontang* in Bugis language or *lura* in Makassar Konjo, the language of the Kajang. It is rare to have the kitchen situated within the main part of the house in Indonesia as [21] verifies. This is because, Indonesians in remote areas still cook by traditional methods which produce smoke.

Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates while the *para-para* on the opposite side is used to the storage floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to [17], and are referred to as *tanre-tanreang* in Bugis. However, this element has been slowly disappearing.

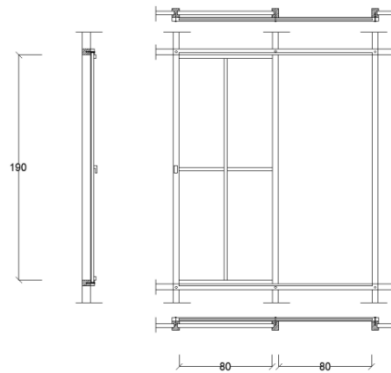
## 5.2. Indigenous Techniques to Maximize Ventilation and Light

The customary rules concerning windows allows for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right (see figure 9).

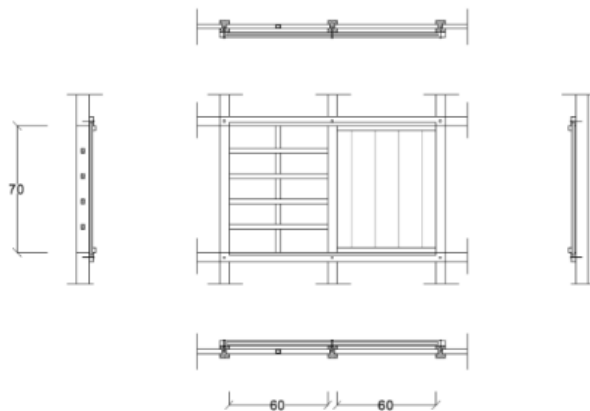


**Picture 9:** Cross Ventilaton Sketch by Andi Abidah 2020  
The number three is significant in Ammatoa Kajang culture so every

house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size but their rectangular shape, style and material were uniform. All windows are fitted with wood bars as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in (figures 10 and 11), is unique to Ammatoa Kajang dwellings.



**Figure 10.** *Sliding window model Sketch by Andi Abidah 2020*



**Figure 11.** *Sliding window model Sketch by Andi Abidah 2020*

Generally, the floor is constructed of wood and bamboo. Bamboo slats

are used in the first and second latte while the *tala-tala* has a plank floor. The flooring throughout each house has approximately one centimetre gaps between each wooden plank and bamboo slat to allow air circulation even at night when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to [22], can be seen in traditional Thai houses that use bamboo, wood planks, and thatch the difference being that bamboo is used not only in the corridor of the house but also in roof construction to support the thatch.

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, the density or distance between the dwellings and any other barriers such as vegetation that would decrease air quality and flow. The distance between houses is between three to five meters with well maintained foliage surrounding each house [23]. Futhermore, [24] observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### 5.3. Indigenous Management of Clean and Black Water

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water positioned at 5°19'27.7"S 120°17'56.5"E that serves three villages see (figure 12).



**Figure 12** Source fresh water Source : Internet 2020

The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking. In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the house's left side, flows into a low area and seeps into the ground.

For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meters area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter dug 2 to 3 meters into the ground which is covered with two sizeable flat rocks placed with a gap between for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as [25] explains, which actually receives good marks in terms of environmental and energy profits when such processing systems are integrated into green structures.

## **6. Conclusion**

Even though the Ammatoa Kajang indigenous community in the Kajang Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the *Pasang ri Kajang* together with the directives of their customary institutions that regulate the community's interactions with their environment and each other for their physical, mental, and spiritual well-being. The Kajang Dalam residents have sustained a refreshing green environment that flows through their homes where they admit to feeling very comfortable.

## **Acknowledgments**

Thanks for Universitas Negeri Makassar give opportunities to us for making research in Kajang. Funded by DIPA PNBP of Postgraduate program at Universitas Negeri Makassar. Thanks also for the communities of Kajang specially Kajang Dalam.

## Note

<sup>1</sup> The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulsel. AMAN (Aliansi Masyarakat Adat Nusantara / Alliance of Indigenous Peoples of the Archipelago).

<sup>2</sup> Ammatoa is the local language of the head of customs or leader of the custom of Kajang Dalam. Kajang Dalam as the area still preserving her tradition, culture, religion, and no modernization of this area. While Kajang luar is already accepting modernization. The communities step by step avoid tradition, culture, and religion.

## REFERENCES

- [1] Rudi Gunawan, *Rencana Rumah Sehat*. Kanisus.
- [2] R. Waterson, 'The Living House An Anthroplology of Architecture in South-EastAsia', Oxford University Press Pte Ltd, 1990.
- [3] C. Pelras, 'Religion, Tradition and Dynamics of Islamization in South Sulawesi', vol. 29, pp. 107–135, 1985.
- [4] A. Rapoport, 'Culture , Architecture , and Design'.
- [5] E. Erawati Lewa, 'Arsitektur Rumah Tradisional Suku Kajang di Provinsi Sulawesi Selatan', *Mozaik Hum.*, vol. 18, no. 80–92, pp. 1689–1699, 2018.
- [6] Palembang Nadji, *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar., 2006.
- [7] W. W. Osman, 'Karakteristik dan Aturan Adat pada Tatanan Rumah Tinggal dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.', Tesis Jurusan Teknik Arsitektur ITS. Surabaya, 2000.
- [8] J. C. Gallahue, D.L., dan Ozmun, *Understanding Motor Development Infant Children, Adolescent, Adults*. USA : Mac Graw Hill Company., 1998.
- [9] P. Oliver, Ed., 'Theories and Principles', in *Encyclopedia of Vernacular Architecture of the World*, The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Chamridge University Press, 1997, pp. 6–15.
- [10] S. Aminah, *Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang*. Depatemen P & K Sulawesi Selatan, 1989.
- [11] A. Abidah, M. Yahya, and B. A. Rauf, 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants', pp. 446–448.
- [12] I. H. Darmawan, 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba', Universitas Islam Negeri Alauddin Makassar, 2019.
- [13] M. A. Wiwik Wahidah Osman, Shirly Wunas, 'Struktur Kawasan

- Permukiman Ammatoa Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang', *lplbi*, no. 1, pp. 127–130, 2016.
- [14] Sukman, 'Arsitektur Vernakular Ammatoa Kajang di Sulawesi Selatan', Universitas Gaja Mada, 1993.
- [15] Nurhayati, 'Karakteristik Rumah tinggal Tradisional kawasan Ammatoa Kajang', UNHAS, 2000.
- [16] P. J.M.Nas, 'The house in Indonesia Between globalization and localization', *Bijdr. tot Taal-, Land- en Volkenkd.*, vol. 2, pp. 335–360, 1998.
- [17] A. Abidah, 'Nobel and Commoner Bugis houses in the regency of Soppeng South Sulawesi, Indonesia', Vienna University of Technology, 2019.
- [18] Z. Zain, 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan', Technische Universität Wien, 2012.
- [19] I. M. Bidja, *Asta Kosala-Kosali Asta Bumi*. PB, 2000.
- [20] C. Pelras, 'Bugis and Makassar Houses Variation and evolution', in *Indonesian houses*, R. Schefold, G. Domenig, and P. J.M.Nas, Eds. Singapore: SUP Singapore University Press, 2004, pp. 251–281.
- [21] J. Forshee, *Culture and Customs of Indonesia.*, Culture an. London: British Library Cataloguing, 2006.
- [22] S. Chuki, R. Sarkar, and R. Kurar, 'A Review on Traditional Architecture Houses in Buddhist Culture', *Am. J. Civ. Eng. Archit.*, vol. 5, no. 3, pp. 113–123, 2017.
- [23] T. E. Swasti, 'Pengaruh Kerapatan Bangunan pada Karakteristik Termal Rumah Tinggal Kampung Naga terhadap Kenyamanan Penghuni', *J. Arsitektur, Bangunan, Lingkung.*, vol. 5, no. 2, pp. 83–90, 2016.
- [24] Dipl. Ing. Y.B Mangun Wijaya, *Pengantar Fisika Bangunan*. Penerbit Djambatan, 1988.
- [25] F. Boano *et al.*, 'A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits', *Sci. Total Environ.*, vol. 711, p. 134731, 2020.

## Biographical Notes

**Andi Abidah** finished her doctoral study in Institute Building History and Building Archaeology at TU Wien, Austria. Now, she is head of the Architecture study program at Universitas Negeri Makassar, Indonesia. Interest does research about history of architecture, urban and culture.

**Muhammad Yahya**, He is a professor and Dean of Faculty of Engineering, Universitas Negeri Makassar, Indonesia. One of his interests research is occupational safety, health, and safety, education.

**Bakhrani A. Rauf**, a professor in environmental and population education, have two a bachelor's degrees are architecture and education, and a master's degree in the field of architecture. Research interest is architecture and environmental education.

### **Summary**

Even today, there are indigenous peoples communities in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed by taking into consideration where and how their houses are built and the effects of their dwellings on the physiology of the occupants as well the social, spiritual and cultural relations within their community, integrated with their system of beliefs and their environment. One of these indigenous communities, who lives this way and has shunned all forms of modernization, is the Ammatoa Kajang who inhabit a remote area of South Sulawesi province. Their traditional homes that are built even today adhere to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community





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**paper submission Conservation Science in Cultural Heritage**

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Salvatore Lorusso <salvatore.lorusso@unibo.it>  
To: "ANDI ABIDAH, ST, MT UNM" <andi.abidah@unm.ac.id>

3 August 2021 at 23:19

Dear Dr. Abidah,

Your paper "*Healthy Homes of the Ammatoa Kajang Indigenous People*" has been evaluated positively by the Qualified Reviewers and can therefore be accepted for publication in N.21(2021) of the Journal *Conservation Science in Cultural Heritage*.

To proceed, you now have to pay the APC (Author Publishing Charge). The APC is 300 euros + VAT4% = 312.00 euros total and has to be paid directly to the Publisher - L'Erma di Bretschneider - as indicated below.

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Best wishes  
Salvatore Lorusso  
Editor-in-Chief



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Again Thank you very much.

Stay safety

Abidah

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[Quoted text hidden]



ANDI ABIDAH, ST, MT UNM <andi.abidah@unm.ac.id>

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## Need informasi

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ANDI ABIDAH, ST, MT UNM <andi.abidah@unm.ac.id>

28 September 2021 at 09:35

To: Salvatore Lorusso <salvatore.lorusso@unibo.it>

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Greetings,

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Best regards from the hot weather at Makassar.

Abidah



ANDI ABIDAH, ST, MT UNM &lt;andi.abidah@unm.ac.id&gt;

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**paper submission Conservation Science in Cultural Heritage**

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A Braidia &lt;angie\_ambra@yahoo.co.uk&gt;

3 December 2021 at 22:55

To: "andi.abidah@unm.ac.id" &lt;andi.abidah@unm.ac.id&gt;, salvatore lorusso &lt;salvatore.lorusso@unibo.it&gt;

Dear Dr. Andi Abidah,

I am writing in reference to the submission of your paper, "*The healthy homes of the Ammatoa Kajang indigenous people, Indonesia*", to the Journal "*Conservation Science in Cultural Heritage*", for issue N.21 (to be published early 2022).

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Please confirm the correct receipt of this email and attachment.

Thank you.

Yours sincerely  
Angela Mari Braidia  
Linguistic Advisor



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# **The healthy homes of the Ammatoa Kajang indigenous people, Indonesia**

**Andi Abidah\***

Study Programme of Architecture  
Universitas Negeri Makassar, Makassar-Indonesia

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## ***1. Introduction***

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia, traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO) where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live and their physical and mental health has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment as well as its maintenance. Further, Rudi [1] states that a healthy house has clean water available with good plumbing and sanitation to deal with clean and dirty water, is well lit and has good cross ventilation. The temperature and humidity of the room can affect the comfort and health of the occupants.

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Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C –30°C with humidity between 40% and 70% to ensure the comfort of its occupants and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years, like the *Ammatoa Kajang* indigenous peoples that has separated itself from all forms of modernization.

<sup>2</sup>The Ammatoa Kajang reside on their ancestral lands of 22689.59 hectares<sup>1</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas, namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as rambang seppang – that covers over 552 hectares and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area) also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life as set by their oral precepts, sayings and principles collectively referred to as the *Pasang ri Kajang*, while residents of the Kajang Luar have embraced most, if not all, forms of modernity.

The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives, such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must be used, how rituals and traditions should be practiced, and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built using informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar and Mandar indigenous peoples of Sulawesi island having floors raised about 180 – 200 centimetres from the ground [2]. The “H-shaped” frames for the structure of the Bugis and Makassar houses that do not use pegs or nails in their construction, as [3] explains, are commonly found throughout Southeast Asia.

However, it is [4] who observes that tradition, custom and culture influence the Kajang Dalam houses's orientation as well as house shape and other aspects of house design. Passed down from generation to generation, every part of the house, including certain elements that are applied, has been given meaning to even recently built houses in the Kajang Dalam customary area. The form of customary Ammatoa Kajang house is divided vertically into three



parts, as [5] explains, namely, the upper level or attic, locally referred to as *pammakkang / rakkeang*, below which is the body of the house called *kale ballak*, and then the open space beneath the house which is called *awasao / siring* (see figure 1).

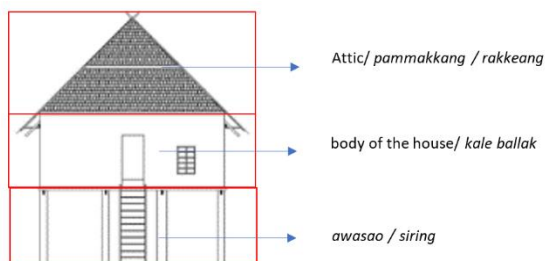


Figure 1. Vertical parts of the home (sketch: Andi Abidah 2020).

The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as living space for the occupants to carry out their daily activities, while the open area under the house is used to keep agricultural tools as well as livestock, such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to [6] also consist of three vertical parts namely, the attic, the body of the house and the area under the house. The attic (*rakkeang*) is the upper level which the Bugis indigenous people consider to be a sacred space; the middle part, the body of the house (*alebola*), is used as an area to carry out daily activities, and the lower part (*wasaubola*) is considered to be a dirty space.

A house's orientation determines the amount of sunlight and air coming into the house as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses' traditional structure, [7] notes that their houses are now oriented toward the road, while the Kajang Dalam maintain their houses' orientation facing west with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider, that will ensure a healthy home, include building materials, room size, and waste disposal. Moreover, [8] observes that temperature, climate and ceiling height also physiologically impact the occupants. Such careful consideration of these can be seen in Kajang Dalam homes.

## 2. Objective

The deep mental, spiritual and cultural connection the Kajang Dalam have with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these

homes influence the physiology of their occupants.

### 3. Methods

This research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour as highlighted by [9]. This is so that the extent of a dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng of the in Kajang Dalam.

This study is the result of the joint research carried out by three lecturers with expertise in ~~three lecturers with expertise in~~ differing fields of study, namely cultural architecture, occupational health and safety, and environmental architecture.

This research process began by conducting a literature study of academic research connected with the Kajang community. This was followed by ~~conducting~~ a field survey of ten objects of study, i.e. the houses, by sketching out drawings – as photography was ~~strictly?/strictly?~~ forbidden – and by collecting the measurements of each house's dimensions. These were then transferred to the AutoCAD 2D application later. Interviews of with the inhabitants of the houses, as well as with community members, were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions to the owners of the respective houses included the age of the house, the position of the kitchen and stairs, as well as room order along with their importance and usage. The data was then correlated, analysed and discussed.

### 4. Results

A sample of ten houses in the Kajang Dalam area were the research objects which are located in the hamlet of Benteng. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three *lura* by two *latte* with a *tala-tala* along the back (see figure 2) while two houses were slightly larger in size measuring 3 *lura* by three *latte* also with a *tala-tala* (see figure 3).

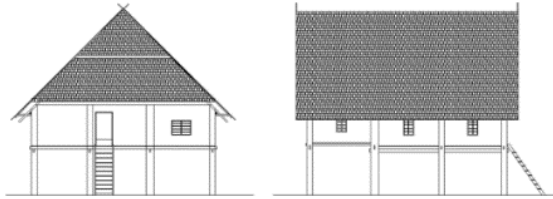


Figure 2. Three lura-two latte plus tala-tala (sketch: Andi Abidah, 2020).

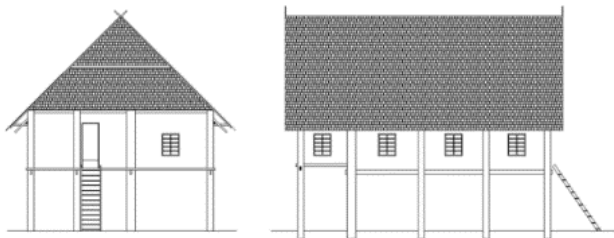


Figure 3. Three lura by three latte plus tala-tala (sketch: Andi Abidah, 2020).

Generally, every house is designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats. Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations which require them to maintain their simple life (see figure 4).



Figure 4. Traditional lamp (pelita: local language) (photograph: Andi Abidah 2020).

## 5. Discussion

Indonesia's geographical position is on the equator, ~~so~~ **which means** that every island in the archipelago experiences high rainfall and humidity, low wind speed and intense sun, **all characteristics of** a tropical climate. ~~so that every~~ **Each** customary dwelling **consequently** requires a design that incorporates a good amount of ventilation in order to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six-hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors in toto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects, culturally distinct communities, which the Ammatoa Kajang refer to in their language as *ilalang embayya* (inside the fenced area), also known as *rambang seppang* or **the** Kajang Dalam area, and the *ipantarang embayya* (outside the fenced area), also known as *rambang luara* or **the** Kajang Luar area [10].

Those who live in the Kajang Luar area are effectively a buffer between those living in the Kajang Dalam area and the world, as they are able to embrace modernity and yet maintain ties to their cultural heritage because they have chosen to only loosely follow a few of the Pasang ri Kajang customs. This can be seen **by in** the Kajang Luar community's use of modern tools and equipment to cultivate their land, in the wearing **of** modern clothing and **inside** their houses, which are often in appearance not much different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the Kajang Luar, as explained by [11], are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction, cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings.

On the other hand, the Kajang Dalam community's houses are built entirely out of natural materials This is in strict obedience to every precept of the Pasang ri Kajang, which influences all aspects of daily life including the construction and placement of every **thatch**-roofed, wood and bamboo home within the environment.

### 5.1. Cultural influences on indigenous dwellings

The Ammatoa Kajang community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in

their sacred forest. Certain areas are allocated for the planting of trees to be used for firewood and construction, while fruit-bearing and other **productive** trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals ~~which~~ **and** is cultivated close to the house by the women. As a result, the Kajang Dalam area remains green and fresh. Nature is an ancestral heritage that needs both its quality and balance to be maintained. The **resolution** of the Kajang Dalam community to preserve their forest and natural surroundings ~~is evident in the application of their firmness to~~ **in applying** the ancestral teachings, called *Pasang ri Kajang* [12]. ~~that~~ **This approach** promotes ~~this~~ **the necessary** balance, ~~so that~~ **enabling** this community ~~always lives to live~~ in comfort and harmony with the natural environment [13].

The houses built within the Kajang Dalam area are in strict adherence to all the customary rules including those that deal with all aspects of the form and elements of their stilt homes, such as ~~each house's~~ the size and orientation **of each house**, the material that may be used for construction, the shape and position of the windows, the ~~position~~ **location** of the kitchen, and the staircase. Even the placement of a house in the Kajang Dalam area and its construction are considered a ritualistic rite as [14] notes. All Kajang Dalam houses, as [15] observes, have small dimensions, are simple in form without any ornamentation and are constructed using similar materials in a standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun, on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

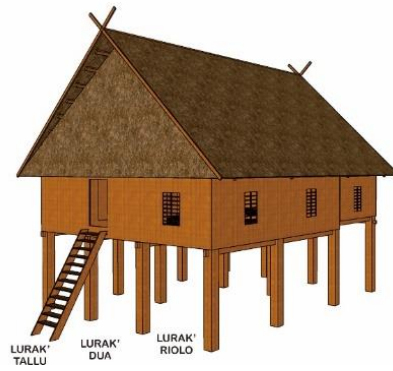
Traditional houses in Indonesia can be seen to have their designs and especially orientations influenced by Hindu and Islam, as explained by [16] Hindu practices forbid houses from being built facing the sunset, as the sun is analogous to life. When Islam started spreading its influence – starting in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to [17], can also be found in the old settlement of the Soppeng-bugis tribe where ~~houses~~ formerly North-South oriented houses are now oriented toward Mecca. However, from the 1970's onwards, new settlements were oriented toward the roads.

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo topped with box gable roofs that have a 45 degree pitch covered with thatch, which is much cooler than the zinc used as roofing in the Kajang Luar area. Generally, the walls and floors are constructed with a combination of wood and bamboo while some houses do not use any bamboo at all. The staircase to the front door, which is centered at the front of the house, is open to the elements so the wood used for **constructing the** stairs ~~construction~~ is of noticeably better quality to withstand

weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted lengthwise across the threshold called a *kappa-kappang*.

The ten objects of this study were similar in size and shape as they use anthropometry is used to set the dimensions of each house and use the terms *lura* for width and *latte* for length are used. Anthropometry is commonly used by many indigenous peoples as a way to measure different things. This It can include, as [9] explains, the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm, as well as other parts of the body including the torso that are used as basic measurement; each presents a unit of measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as [18] states, are based on the human body to determine the height of doors, windows, fences and so on. Furthermore, Balinese house dimensions, as [19] states, use the human body to calculate the size and scale of buildings to ensure that a balance between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used [17]. All the study objects also had a *tala-tala* which is a narrow extension along the back of the house of a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* with a *tala-tala* while two houses were wider by a third, at three *lura* by three *latte* with a *tala-tala* along the rear as shown in figures 5,6,7 and 8.



4

Figure 5. Lura house (source: Andi Abidah 2020).

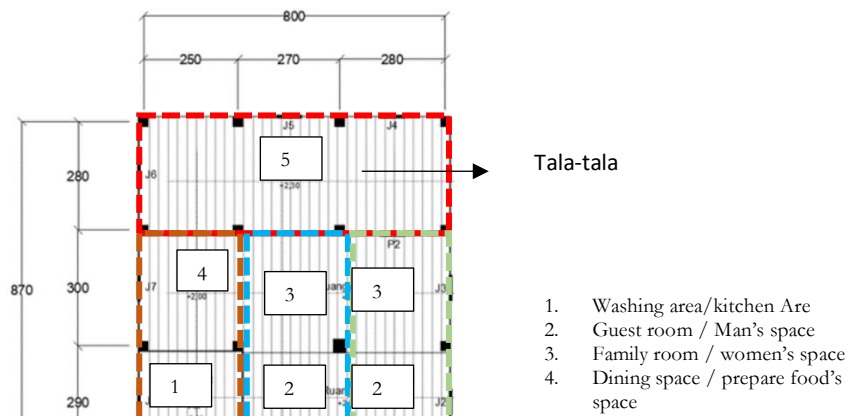


Figure 6. Floor plan of the *lura* and *tala-tala* by Andi Abidah 2020



Figure 7. Latte of the house (source: Andi Abidah 2020).

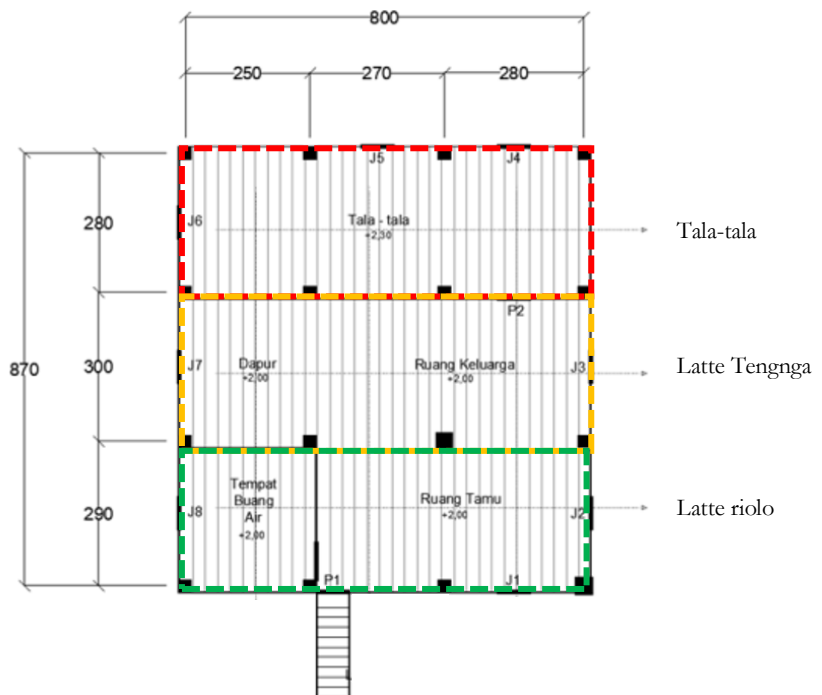


Figure 8. Latte and tala ala in room plan (sketch: Andi Abidah 2020).

The placement of the kitchen is unusual and yet it has remained in this position, unchanged, for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura* of the first *latte* so that it is always visible to guests in the sitting room to the right of the front door as seen in the floor plans of figures 6 and 8. This indicates the openness of the occupants about their food as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones or sometimes simple furnaces are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, which also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container ~~which~~ is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash up before sleeping, as well as a convenient place to urinate at night. By comparison, the kitchen of a Bugis house, as [20] explains, is located in last *lontang* in Bugis language or *lura* in Makassar Konjo, the language of the Kajang. It is rare to have the kitchen situated within the main part of the house in Indonesia as [21] verifies. This is because, Indonesians in remote areas still cook by using traditional methods which produce smoke.

Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates, while the *para-para* on the opposite side is used to ~~the storage~~ store floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to [17], and are referred to as *tanre-tanreang* in Bugis. However, this element ~~has been~~ is slowly disappearing.

## 5.2. Indigenous techniques to maximize ventilation and light

The customary rules concerning windows allow for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right (see figure 9).





Figure 9. Cross ventilaton (sketch: Andi Abidah 2020).

The number three is significant in Ammatoa Kajang culture, so every house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size but their rectangular shape, style and material were uniform. All windows are fitted with wooden bars, as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in (figures 10 and 11), is unique to Ammatoa Kajang dwellings.

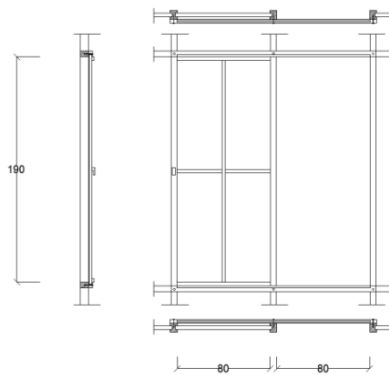


Figure 10. Sliding window model (sketch: Andi Abidah 2020).

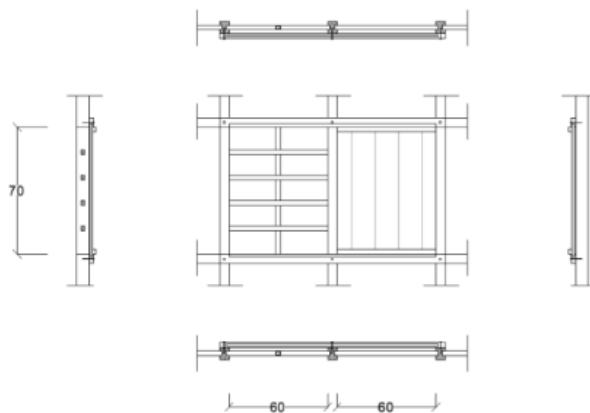


Figure 11. Sliding window model (sketch: Andi Abidah 2020).

Generally, the floor is ~~constructed~~ made of wood and bamboo. Bamboo slats are used in the first and second *latte* while the *tala-tala* has a wooden plank floor. The flooring throughout each house has gaps of approximately one centimetre gaps between each wooden plank and bamboo slat, to allow air circulation even at night, when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to [22], can be seen in traditional Thai houses that use bamboo, wood planks, and thatch, the difference being that bamboo is used not only in the corridor of the house but also in the construction of the roof to support the thatch.

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, the density or distance between the dwellings and any other barriers such as vegetation that would decrease air quality and flow. The distance between houses is between three to five meters with well-maintained foliage surrounding each house [23]. Futhermore, [24] observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### 5.3. Indigenous management of clean and black water

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water positioned at 5°19'27.7" S 120°17'56.5"E that serves three villages (see figure 12).



Figure 12. Source of fresh water (source: Internet 2020).

The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking. In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the left side of the house, flows into a low area and seeps into the ground.

For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meter area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter dug 2 to 3 meters into the ground which is covered with two sizeable flat rocks placed with a gap between for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as [25] explains, which actually receives good marks in terms of environmental and energy profits when such processing systems are integrated into green structures.

## 6. Conclusion

Even though the Ammatoa Kajang indigenous community in the Kajang Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the Pasang ri Kajang together with the directives of their customary institutions that regulate the community's interactions with the environment and each other for their physical, mental, and spiritual well-being. The Kajang Dalam residents have sustained a refreshing green environment that flows through their homes where they admit to feeling very comfortable.

## Acknowledgments

Thanks for to Universitas Negeri Makassar which gave us the opportunity to us for making to carry out research in Kajang; funded by DIPA PNBP of the Postgraduate program at Universitas Negeri Makassar. Thanks also go to the communities of Kajang, especially Kajang Dalam.

## Notes

- <sup>1</sup> The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulsel. AMAN (Aliansi Masyarakat Adat Nusantara / Alliance of Indigenous Peoples of the Archipelago).
- <sup>2</sup> Ammatoa is the local language of the head of customs or leader of the customs of Kajang Dalam; Kajang Dalam is the area that still preserves its tradition, culture, religion, and the area is no modernization of this area has not undergone any modernisation, whereas Kajang luar is already accepting modernization. The communities step by step avoid tradition, culture, and religion.

## References

- [1] Rudi Gunawan, *Rencana Rumah Sehat*. Kanisus.
- [2] R. Waterson, 'The Living House An Antrhropology of Architecture in South-EastAsia', Oxford University Press Pte Ltd, 1990.
- [3] C. Pelras, 'Religion, Tradition and Dynamics of Islamization in South Sulawesi', vol. 29, pp. 107–135, 1985.
- [4] A. Rapoport, 'Culture , Architecture , and Design'.
- [5] E. Erawati Lewa, 'Arsitektur Rumah Tradisional Suku Kajang di Provinsi Sulawesi Selatan', *Mozaik Hum.*, vol. 18, no. 80–92, pp. 1689–1699, 2018.
- [6] Palembang Nadji, *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar., 2006.
- [7] W. W. Osman, 'Karakteristik dan Aturan Adat pada Tatahan Rumah Tinggal dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.', Tesis Jurusan Teknik Arsitektur ITS. Surabaya, 2000.
- [8] J. C. Gallahue, D.L., dan Ozmun, *Understanding Motor Development Infant Children, Adolescent, Adults*. USA : Mac Graw Hill Company., 1998.
- [9] P. Oliver, Ed., 'Theories and Principles', in *Encyclopedia of Vernacular Architecture of the World*, The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Chamridge University Press, 1997, pp. 6–15.
- [10] S. Aminah, *Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang*. Depatement P & K Sulawesi Selatan, 1989.
- [11] A. Abidah, M. Yahya, and B. A. Rauf, 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants', pp. 446–448.
- [12] I. H. Darmawan, 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba', Universitas Islam Negeri Alauddin Makassar, 2019.

- [13] M. A. Wiwik Wahidah Osman, Shirly Wunas, 'Struktur Kawasan Permukiman Ammatoa Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang', *lplbi*, no. 1, pp. 127–130, 2016.
- [14] Sukman, 'Arsitektur Vernakular Ammatoa Kajang di Sulawesi Selatan', Universitas Gaja Mada, 1993.
- [15] Nurhayati, 'Karakteristik Rumah tinggal Tradisional kawasan Ammatoa Kajang', UNHAS, 2000.
- [16] P. J.M.Nas, 'The house in Indonesia Between globalization and localization', *Bijdr. tot Taal-, Land- en Volkenkd.*, vol. 2, pp. 335–360, 1998.
- [17] A. Abidah, 'Nobel and Commoner Bugis houses in the regency of Soppeng South Sulawesi, Indonesia', Vienna University of Technology, 2019.
- [18] Z. Zain, 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan', Technische Universität Wien, 2012.
- [19] I. M. Bidja, *Asta Kosala-Kosali Asta Bumi*. PB, 2000.
- [20] C. Pelras, 'Bugis and Makassar Houses Variation and evolution', in *Indonesian houses*, R. Schefold, G. Domenig, and P. J.M.Nas, Eds. Singapore: SUP Singapore University Press, 2004, pp. 251–281.
- [21] J. Forshee, *Culture and Customs of Indonesia.*, Culture an. London: British Library Cataloguing, 2006.
- [22] S. Chuki, R. Sarkar, and R. Kurar, 'A Review on Traditional Architecture Houses in Buddhist Culture', *Am. J. Civ. Eng. Archit.*, vol. 5, no. 3, pp. 113–123, 2017.
- [23] T. E. Swasti, 'Pengaruh Kerapatan Bangunan pada Karakteristik Termal Rumah Tinggal Kampung Naga terhadap Kenyamanan Penghuni', *J. Arsitektur, Bangunan, Lingkung.*, vol. 5, no. 2, pp. 83–90, 2016.
- [24] Dipl. Ing. Y.B Mangun Wijaya, *Pengantar Fisika Bangunan*. Penerbit Djambatan, 1988.
- [25] F. Boano *et al.*, 'A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits', *Sci. Total Environ.*, vol. 711, p. 134731, 2020.

### Biographical Notes

**Andi Abidah** finished her doctoral studies at the Institute of Building History and Building Archaeology at TU Wien, Austria. Now, she is head of the Architecture study program at Universitas Negeri Makassar, Indonesia. Her interests include research about the history of architecture, and urban and culture.

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### Summary

Even today, there are communities of indigenous peoples communities in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed by taking into consideration where and how their houses are built and the effects of their dwellings on the physiology of the occupants as well as the social, spiritual and cultural relations within their community, integrated with their system of beliefs and their environment. One of these indigenous communities, who lives this way of life and has shunned all forms of modernization, is the Ammatoa Kajang, who inhabit a remote area of the South Sulawesi province. Their traditional homes, that are built even today, are built adhering to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community.



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**paper submission Conservation Science in Cultural Heritage**

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8 December 2021 at 16:30

To: A Braida <angie\_ambra@yahoo.co.uk>

Dear  
Angela Mari Braida  
Linguistic Advisor

The paper was improved in the attachment file  
thank you very much for your kind.

Best Regard from Indonesia

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# **The healthy homes of the Ammatoa Kajang indigenous people, Indonesia**

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## ***1. Introduction***

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia, traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO) where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live and their physical and mental health has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment as well as its maintenance. Further, Rudi [1] states that a healthy house has clean water available with good plumbing and sanitation to deal with clean and dirty water, is well lit and has good cross ventilation. The temperature and humidity of the room can affect the comfort and health of the occupants.

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Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C –30°C with humidity between 40% and 70% to ensure the comfort of its occupants and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years, like the *Ammatoa Kajang* indigenous peoples that has separated itself from all forms of modernization.

The Ammatoa Kajang reside on their ancestral lands of 22689.59 hectares<sup>2</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas, namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as rambang seppang – that covers over 552 hectares and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area) also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life as set by their oral precepts, sayings and principles collectively referred to as the *Pasang ri Kajang*, while residents of the Kajang Luar have embraced most, if not all, forms of modernity.

The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives, such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must be used, how rituals and traditions should be practiced, and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built using informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar and Mandar indigenous peoples of Sulawesi island having floors raised about 180 – 200 centimetres from the ground R. Waterson [2]. The “H-shaped” frames for the structure of the Bugis and Makassar houses that do not use pegs or nails in their construction, as C. Pelras [3] explains, are commonly found throughout Southeast Asia.

However, it is Amos Rapoport [4] who observes that tradition, custom and culture influence the Kajang Dalam houses's orientation as well as house shape and other aspects of house design. Passed down from generation to generation, every part of the house, including certain elements that are applied, has been given meaning to even recently built houses in the Kajang Dalam customary area. The form of costumery Ammatoa Kajang house is

divided vertically into three parts, namely, the upper level or attic, locally referred to as *pammakkang / rakkeang*, below which is the body of the house called *kale ballak*, and then the open space beneath the house which is called *awasao / siring* as explains, Erawati Lewa [5] (see figure 1).

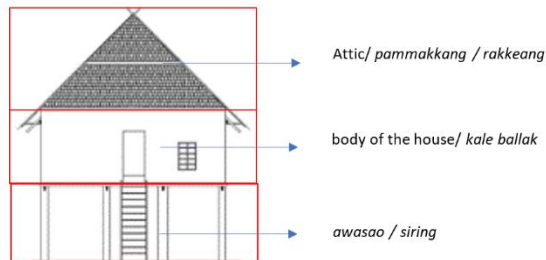


Figure 1. Vertical parts of the home (sketch: Andi Abidah 2020).

The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as living space for the occupants to carry out their daily activities, while the open area under the house is used to keep agricultural tools as well as livestock, such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to Palemmui Nadjji [6] also consist of three vertical parts namely, the attic, the body of the house and the area under the house. The attic (*rakkeang*) is the upper level which the Bugis indigenous people consider to be a sacred space; the middle part, the body of the house (*alebola*), is used as an area to carry out daily activities, and the lower part (*wasaubola*) is considered to be a dirty space. Lower part is space to put work clothes such as working from field and garden, space for chicken and duck, and also watch dong.

A house's orientation determines the amount of sunlight and air coming into it as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses' traditional structure, W. Osman [7] notes that their houses are now oriented toward the road, while the Kajang Dalam maintain their houses' orientation facing west with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider, that will ensure a healthy home, include building materials, room size, and waste disposal. Moreover, J. C. Gallahue, D.L., dan Ozmun [8] observes that temperature, climate and ceiling height also physiologically impact the occupants. Such careful consideration of these can be seen in Kajang Dalam homes.

## 2. Objective

The deep mental, spiritual and cultural connection the Kajang Dalam have

with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these homes influence the physiology of their occupants.

### 3. Methods

This research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour as highlighted by P. Olive [9]. This is so that the extent of a dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng in Kajang Dalam.

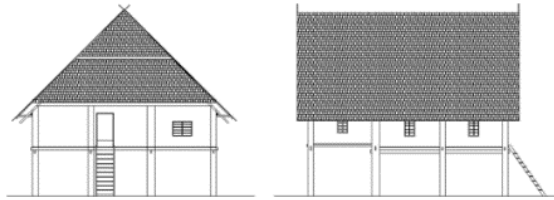
This study is the result of the joint research carried out by three lecturers with expertise in differing fields of study, namely cultural and history of architecture, occupational health and safety, and environmental architecture.

This research process began by conducting a literature study of academic research connected with the Kajang community. This was followed by a field survey of ten objects of study, i.e. the houses, by sketching out drawings – as photography was strictly forbidden – and by collecting the measurements of each house's dimensions. These were then transferred to the AutoCAD 2D application. Interviews with the inhabitants of the houses, as well as with community members, were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions to the owners of the respective houses included the age of the house, the position of the kitchen and stairs, as well as room order along with their importance and usage. The data was then correlated, analysed and discussed.

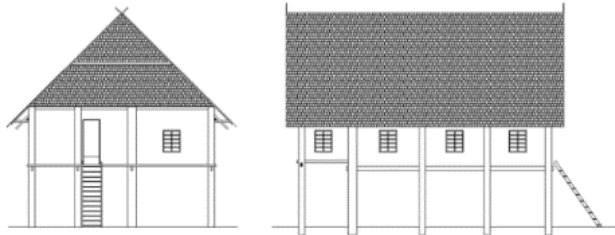
### 4. Results

A sample of ten houses in the Kajang Dalam area were the research objects which are located in the hamlet of Benteng. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three *lura* by two *latte* with a *tala-tala* along the back (see figure 2) while two houses were slightly larger in size measuring 3 *lura* by three *latte* also with a *tala-tala* (see figure 3). In the traditional houses in South Sulawesi are not use measuring by metering but using the how much number of *lura* and *latte* (Kajang) example two *latte* and two *lontang*, it means the measuring of the house use two *latte* and two

*lontang.*



*Figure 2. The house use three lura and two latte plus tala-tala (sketch: Andi Abidah, 2020).*



*Figure 3. Three lura by three latte plus tala-tala (sketch: Andi Abidah, 2020).*

Generally, every house is designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats. Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations which require them to maintain their simple life (see figure 4).



*Figure 4. Traditional lamp (pelita: local language). The house is Mustamin. Which the researchers team staying. (photograph: Andi Abidah 2020).*

## 5. Discussion

Indonesia's geographical position is on the equator, which means that every island in the archipelago experiences high rainfall and humidity, low wind speed and intense sun, all characteristics of a tropical climate. Each customary dwelling consequently requires a design that incorporates a good amount of ventilation in order to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six-hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors in toto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects, culturally distinct communities, which the Ammatoa Kajang refer to in their language as *ilalang embayya* (inside the fenced area), also known as *rambang seppang* or the Kajang Dalam area, and the *ipantarang embayya* (outside the fenced area), also known as *rambang luara* or the Kajang Luar area S. Aminah [10].

Those who live in the Kajang Luar area are effectively a buffer between those living in the Kajang Dalam area and the world, as they are able to embrace modernity and yet maintain ties to their cultural heritage because they have chosen to only loosely follow a few of the Pasang ri Kajang customs. This can be seen in the Kajang Luar community's use of modern tools and equipment to cultivate their land, in the wearing of modern clothing and inside their houses, which are often in appearance not much different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the Kajang Luar, are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction, cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings as explained by A. Abidah, M. Yahya, and B. A. Rauf [11].

On the other hand, the Kajang Dalam community's houses are built entirely out of natural materials This is in strict obedience to every precept of the Pasang ri Kajang, which influences all aspects of daily life including the construction and placement of every thatch-roofed, wood and bamboo home within the environment.

### 5.1. Cultural influences on indigenous dwellings

The Ammatoa Kajang community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in their sacred forest. Certain areas are allocated for the planting of trees to be

used for firewood and construction, while fruit-bearing and other productive trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals and is cultivated close to the house by the women. As a result, the Kajang Dalam area remains green and fresh. Nature is an ancestral heritage that needs both its quality and balance to be maintained. The resolution of the Kajang Dalam community to preserve their forest and natural surroundings is evident in their firmness to in applying the ancestral teachings, called *Pasang ri Kajang* I. H. Darmawan [12]. This approach promotes the necessary balance, enabling this community to live in comfort and harmony with the natural environment explained by Mimi. Aarifin. Wiwik Wahidah Osman, Shirly Wunas [13].

The houses built within the Kajang Dalam area are in strict adherence to all the customary rules including those that deal with all aspects of the form and elements of their stilt homes, such as the size and orientation of each house, the material that may be used for construction, the shape and position of the windows, the location of the kitchen, and the staircase. Even the placement of a house in the Kajang Dalam area and its construction are considered a ritualistic rite as Sukman [14] notes. All Kajang Dalam houses, as Nurhayati [15] observes, have small dimensions, are simple in form without any ornamentation and are constructed using similar materials in a standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun, on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

Traditional houses in Indonesia can be seen to have their designs and especially orientations influenced by Hindu and Islam, as explained by P. J.M.Nas [16] Hindu practices forbid houses from being built facing the sunset, as the sun is analogous to life. When Islam started spreading its influence – starting in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to A. Abidah [17], can also be found in the old settlement of the Soppeng-bugis tribe where formerly North-South oriented houses are now oriented toward Mecca. However, from the 1970's onwards, new settlements were oriented toward the roads. [It was regulation of the local government at the time. Until now the houses are oriented to road.](#)

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo topped with box gable roofs that have a 45 degree pitch covered with thatch roof, which is much cooler than the zinc used as roofing in the Kajang Luar area. Generally, the walls and floors are constructed with a combination of wood and bamboo while some houses do not use any bamboo at all. The staircase to the front door, which is centered at the front of the house, is open to the elements so the wood used for

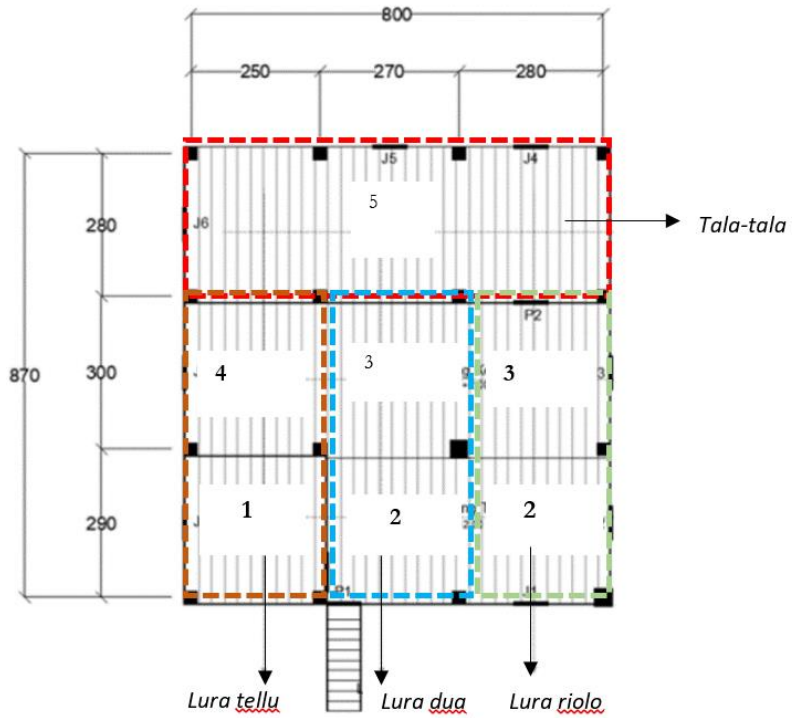
constructing the stairs is of noticeably better quality to withstand weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted lengthwise across the threshold called a *kappa-kappang*.

The ten objects of this study were similar in size and shape as anthropometry is used to set the dimensions of each house and the terms *lura* for width and *latte* for length are used. *Dimensions of one lura/latte are taken from body dimension of the owner such as one depa and one hasta etc. Depa is a measure of length; the span of a man's body and out-stretched arms measuring from fingertips to fingertips. Hasta is measured from the elbow to the tip of the middle finger.* Anthropometry is commonly used by many indigenous peoples as a way to measure different things. It can include, as Paul Oliver [9] explains, the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm, as well as other parts of the body including the torso each presents a unit of measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as Z. Zain [18] states, are based on the human body to determine the height of doors, windows, fences and so on. Furthermore, Balinese house dimensions, as I. M. Bidja [19] states, use the human body to calculate the size and scale of buildings to ensure that a balance between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used Andi Abidah [17]. All the study objects also had a *tala-tala* which is a narrow extension along the back of the house of a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* with a *tala-tala* while two houses were wider by a third, at three *lura* by three *latte* with a *tala-tala* along the rear as shown in figures 5,6,7 and 8.



Figure 5. Lura of house (source: Andi Abidah 2020).



1. Washing area and kitchen Are
2. Guest room and Man's space
3. Family room and women's space
4. Dining space and prepare food's space
5. Sleeping room for girls or women guest

**Figure 6.** Floor plan of the *lura* and *tala-tala* by Andi Abidah 2020





Figure 7. Latte or latta of the house (source: Andi Abidah 2020).

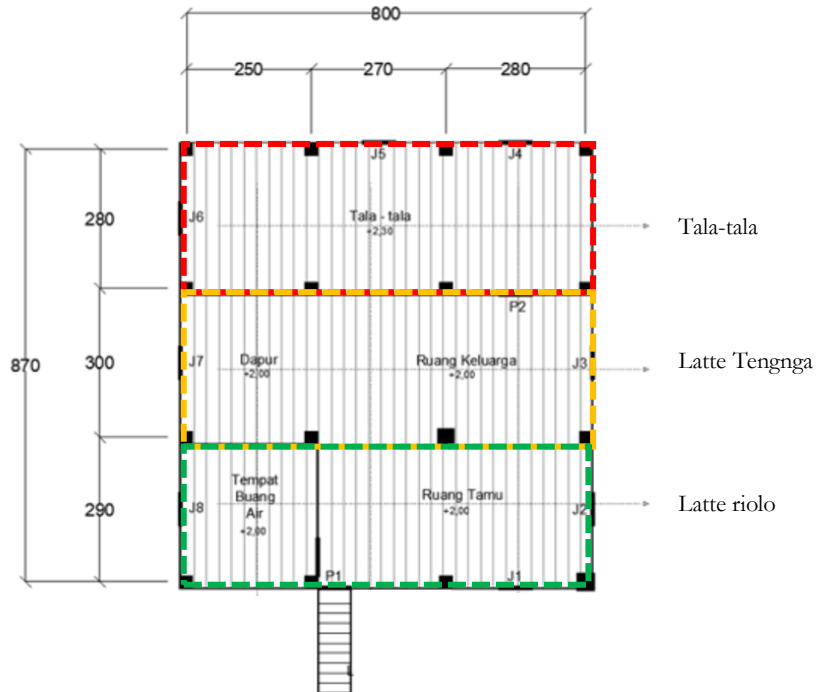


Figure 8. Latte and tala ala in room plan (sketch: Andi Abidah 2020).

The placement of the kitchen is unusual and yet it has remained in this position, unchanged, for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura* of the first *latte* so that it is always visible to guests in the sitting room to the

right of the front door as seen in the floor plans of figures 6 and 8. This indicates the openness of the occupants about their food as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones or sometimes simple furnaces are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, which also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash up before sleeping, as well as a convenient place to urinate at night. By comparison, the kitchen of a Bugis house, as C. Pelras [20] explained that located of Bugis house's kitchen in last *lontang* or in the last part of house. (*lontang* :Bugis language or *lura* in Makassar Konjo language / the language of the Kajang). It is rare to have the kitchen situated within the main part of the house in Indonesia as J. Forshee [21] verifies. This is because, Indonesians in remote areas still cook using traditional methods which produce smoke.

Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates, while the *para-para* on the opposite side is used to store floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to And Abidah [17], and are referred to as *tanre-tanreang* in Bugis. However, this element is slowly disappearing.

## 5.2. Indigenous techniques to maximize ventilation and light

The customary rules concerning windows allow for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right (see figure 9).



Figure 9. Cross ventilaton (sketch: Andi Abidah 2020).

The number three is significant in Ammatoa Kajang culture, so every house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size but their rectangular shape, style and material were uniform. All windows are fitted with wooden bars, as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in (figures 10 and 11), is unique to Ammatoa Kajang dwellings.

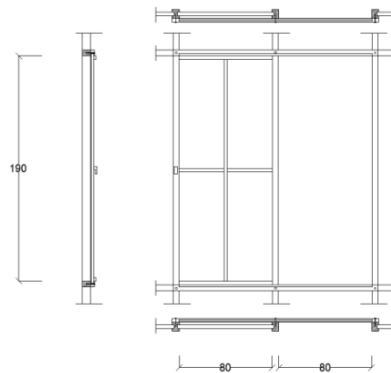


Figure 10. Sliding window model (sketch: Andi Abidah 2020).

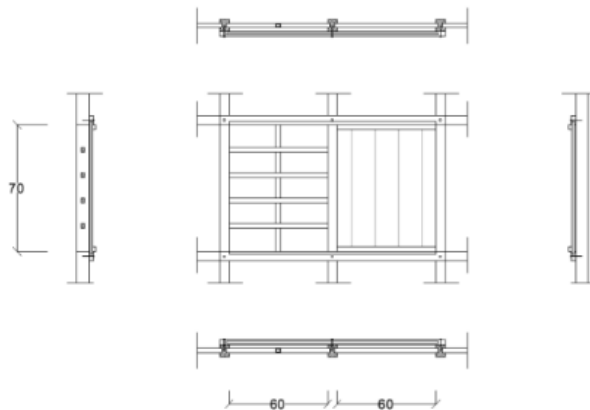


Figure 11. Sliding window model (sketch: Andi Abidah 2020).

Generally, the floor is made of wood and bamboo. Bamboo slats are used in the first and second *latte* while the *tala-tala* has a wooden floor. The flooring throughout each house has gaps of approximately one centimetre ~~gaps~~ between each wooden plank and bamboo slat, to allow air circulation even at night, when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to S. Chuki, R. Sarkar, and R. Kurar [22], can be seen in traditional Thai houses that use bamboo, wood planks, and thatch, the difference being that bamboo is used not only in the corridor of the house but also in the construction of the roof to support the thatch.

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, the density or distance between the dwellings and any other barriers such as vegetation that would decrease air quality and flow. The distance between houses is between three to five meters with well-maintained foliage surrounding each house T. E. Swasti, [23]. Futhermore, Dipl. Ing. Y.B Mangun Wijaya [24] observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### **5.3. Indigenous management of clean and black water**

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water positioned at 5°19'27.7" S 120°17'56.5"E that serves three villages (see figure 12).



Figure 12. Source of fresh water (source: Internet 2020).

The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking. In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the left side of the house flows into a low area and seeps into the ground.

For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meter area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter dug 2 to 3 meters into the ground which is covered with two sizeable flat rocks placed with a gap between for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as F. Boano *et al* [25] explains, which actually receives good marks in terms of environmental and energy profits when such processing systems are integrated into green structures. [Through existing rules, local communities have been applied for generations to maintain and process natural ecosystems towards a continuous environment.](#)

## 6. Conclusion

Even though the Ammatoa Kajang indigenous community in the Kajang

Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the Pasang ri Kajang together with the directives of their customary institutions that regulate the community's interactions with the environment and each other for their physical, mental, and spiritual well-being. The Kajang Dalam residents have sustained a refreshing green environment that flows through their homes where they admit to feeling very comfortable. [The Kajang Dalam peoples concept that each people have to maintain nature to be green. Each people in the area must plant one or two trees after cut one tree. they believe that nature will be angry if they violate customary rules.](#)

## Acknowledgments

Thanks to Universitas Negeri Makassar which gave us the opportunity to carry out research in Kajang; funded by DIPA PNBP of the Postgraduate program at Universitas Negeri Makassar. Thanks also go to the communities of Kajang, especially Kajang Dalam.

## Notes

<sup>1</sup> Ammatoa is the local language of the head of customs or leader of the customs of Kajang Dalam; Kajang Dalam area is the area that still preserves its tradition, culture, religion, and has not undergone any modernisation, whereas Kajang Luar is already accepting modernization. The communities of Kajang Luar area step by step avoid tradition, culture, and religion. [Because of the area be use to electrical lamp, watching tv, and modern material in their home.](#)

<sup>2</sup>The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulsel. AMAN (Aliansi Masyarakat Adat Nusantara / Alliance of Indigenous Peoples of the Archipelago).

## References

- [1] Rudi Gunawan, *Rencana Rumah Sehat*. Kanisus.
- [2] R. Waterson, 'The Living House An Antrhropology of Architecture in South-EastAsia', Oxford University Press Pte Ltd, 1990.
- [3] C. Pelras, 'Religion, Tradition and Dynamics of Islamization in South Sulawesi', vol. 29, pp. 107–135, 1985.
- [4] A. Rapoport, 'Culture , Architecture , and Design'.

- [5] Erawati Lewa, 'Arsitektur Rumah Tradisional Suku Kajang di Provinsi Sulawesi Selatan', *Mozaik Hum.*, vol. 18, no. 80–92, pp. 1689–1699, 2018.
- [6] Palembang Nadji, *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar., 2006.
- [7] W. Osman, 'Karakteristik dan Aturan Adat pada Tataan Rumah Tinggal dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.', Tesis Jurusan Teknik Arsitektur ITS. Surabaya, 2000.
- [8] J. C. Gallahue, D.L., dan Ozmun, *Understanding Motor Development Infant Children, Adolescent, Adults*. USA : Mac Graw Hill Company., 1998.
- [9] P. Oliver, Ed., 'Theories and Principles', in *Encyclopedia of Vernacular Architecture of the World*, The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Chamridge University Press, 1997, pp. 6–15.
- [10] S. Aminah, *Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang*. Depatement P & K Sulawesi Selatan, 1989.
- [11] A. Abidah, M. Yahya, and B. A. Rauf, 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants', pp. 446–448.
- [12] I. H. Darmawan, 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba', Universitas Islam Negeri Alauddin Makassar, 2019.
- [13] Mimi. Aarifin. Wiwik Wahidah Osman, Shirly Wunas, 'Struktur Kawasan Permukiman Ammatoa Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang', *lpbi*, no. 1, pp. 127–130, 2016.
- [14] Sukman, 'Arsitektur Vernakular Ammatoa Kajang di Sulawesi Selatan', Universitas Gaja Mada, 1993.
- [15] Nurhayati, 'Karakteristik Rumah tinggal Tradisional kawasan Ammatoa Kajang', UNHAS, 2000.
- [16] P. J.M.Nas, 'The house in Indonesia Between globalization and localization', *Bijdr. tot Taal-, Land- en Volkenkd.*, vol. 2, pp. 335–360, 1998.
- [17] A. Abidah, 'Nobel and Commoner Bugis houses in the regency of Soppeng South Sulawesi, Indonesia', Vienna University of Technology, 2019.
- [18] Z. Zain, 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan', Technische Universität Wien, 2012.
- [19] I. M. Bidja, *Asta Kosala-Kosali Asta Bumi*. PB, 2000.
- [20] C. Pelras, 'Bugis and Makassar Houses Variation and evolution', in *Indonesian houses*, R. Schefold, G. Domenig, and P. J.M.Nas, Eds. Singapore: SUP Singapore University Press, 2004, pp. 251–281.

- [21] J. Forshee, *Culture and Customs of Indonesia.*, Culture an. London: British Library Cataloguing, 2006.
- [22] S. Chuki, R. Sarkar, and R. Kurar, 'A Review on Traditional Architecture Houses in Buddhist Culture', *Am. J. Civ. Eng. Archit.*, vol. 5, no. 3, pp. 113–123, 2017.
- [23] T. E. Swasti, 'Pengaruh Kerapatan Bangunan pada Karakteristik Termal Rumah Tinggal Kampung Naga terhadap Kenyamanan Penghuni', *J. Arsitektur, Bangunan, Lingkung.*, vol. 5, no. 2, pp. 83–90, 2016.
- [24] Dipl. Ing. Y.B Mangun Wijaya, *Pengantar Fisika Bangunan*. Penerbit Djambatan, 1988.
- [25] F. Boano *et al.*, 'A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits', *Sci. Total Environ.*, vol. 711, p. 134731, 2020.

### **Biographical Notes**

**Andi Abidah** finished her doctoral studies at the Institute of Building History and Building Archaeology at TU Wien, Austria. Studied Urban Design in Magister's degree of Institute Technology of Bandung, Indonesia. And her architecture bachelor finished at the University of Hasanuddin, Indonesia. Now, she is head of the architecture study program at Universitas Negeri Makassar, Indonesia. Her interests include research about the history and culture of architecture, and urban heritage.

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### **Summary**

Even today, there are communities of indigenous peoples ~~communities~~ in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed by taking into consideration where and how their houses are built and the effects of their dwellings on the physiology of the occupants as well as the social, spiritual and cultural relations within their community, integrated with their system of beliefs and their environment. One of these indigenous communities, who lives this way of life and has shunned all forms of modernization, is the Ammatoa Kajang, who inhabit a remote area of the



South Sulawesi province. Their traditional homes, even today, are built adhering to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community.



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## paper submission Conservation Science in Cultural Heritage

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**A Braida** <angie\_ambra@yahoo.co.uk>

12 December 2021 at 22:29

To: "ANDI ABIDAH, ST, MT UNM" <andi.abidah@unm.ac.id>

Dear Dr. Andi Abidah,

I am returning your paper for further revision.

As before, please check through corrections (grammar - red highlighting), modifications, doubts (yellow highlighting) and comments (clarification, etc. on right-hand side of text) and kindly revise as indicated.

Once you have done so, please return to this address.

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Linguistic Advisor

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# THE HEALTHY HOMES OF THE AMMATOA KAJANG INDIGENOUS PEOPLE, INDONESIA

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*Keywords:*

## **1. Introduction**

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia, traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO) where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live and their physical and mental health has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken, so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment, as well as its maintenance. Further, Rudi [1] states that a healthy house ~~has~~ **should?/must?** have clean water available, with good plumbing and sanitation **systems** to deal with clean and dirty water,

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is be well lit and have good cross ventilation.

The temperature and humidity of the room should also be adequate, as they can affect the comfort/well-being and health of the occupants. Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C –30°C with humidity between 40% and 70% to ensure the comfort of its occupants and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years, like the Ammatoa Kajang indigenous peoples that has who have separated themselves from all forms of modernization.

The Ammatoa Kajang<sup>1</sup> reside on their ancestral lands of 22689.59 hectares<sup>2</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas, namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as *rambang seppang* – which covers over 552 hectares, and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area), also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life, as set by their oral precepts, sayings and principles, collectively referred to as the *Pasang ri Kajang*, while residents of the Kajang Luar have embraced most, if not all, forms of modernity.

The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives, such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must be used, how rituals and traditions should be practiced, and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built using according to the informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar and Mandar indigenous peoples of Sulawesi island having floors raised about 180 – 200 centimetres from the ground R. Waterson [2]. The “H-shaped” frames for the structure of the Bugis and Makassar houses that do not use pegs or nails in their construction, as C. Pelras [3] explains, are commonly found throughout Southeast Asia.

However, it is Amos Rapoport [4] who observes that tradition, custom and culture influence the Kajang Dalam houses's orientation, as well as house shape and other aspects of house design. Passed down from generation to

generation, every part of the house, including certain elements that are applied, has been given meaning to even recently built houses in the Kajang Dalam customary area. The form of customary Ammatoa Kajang house is divided vertically into three parts, namely, the upper level or attic, locally referred to as *pammakkang / rakkeang*, below which is the body of the house called *kale ballak*, and then beneath the house is an open space which is called *awasao / siring*, as Erawati Lewa explains [5] (see figure 1).

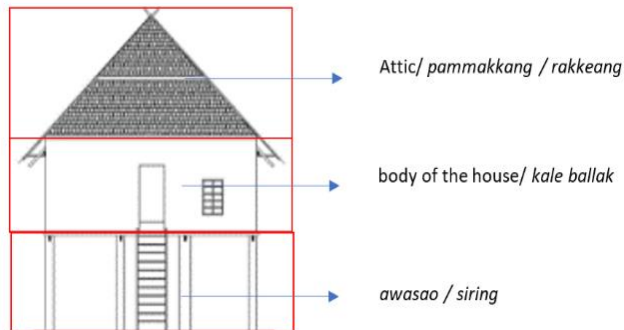


Figure 1. Vertical parts of the home (sketch: Andi Abidah 2020).

The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as a living space for the occupants to carry out their daily activities, while the open area under the house is used to keep agricultural tools, as well as livestock, such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to Palembangi Nadji [6] also consist of three vertical parts namely, the attic, the body of the house and the area under the house. The attic (*rakkeang*) is the upper level, which the Bugis indigenous people consider to be a sacred space; the middle part, the body of the house (*alebola*), is used as an area to carry out daily activities, and the lower part (*wasaubola*) is considered to be a “dirty” space (i.e. a space to put work clothes after they have been used for working in the fields and garden, and a space for chickens and ducks, and also watch dong).

The orientation of the house determines the amount of sunlight and air entering it, as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses’ traditional structure, W. Osman [7] notes that their houses are now oriented toward the road, while the Kajang Dalam maintain their houses’ orientation facing west, with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider that will ensure a healthy home include building materials, room size, and waste disposal. Moreover, Gallahue, D.L. and J.C. Ozmun [8] observe that temperature, climate and ceiling height also physiologically impact the

occupants; such careful consideration of these elements can be seen in Kajang Dalam homes.

## 2. Objective

The deep mental, spiritual and cultural connection the Kajang Dalam have with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these homes influence the physiology of their occupants.

## 3. Methods

The research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour, as highlighted by P. Olive [9]. This is so that the extent of a dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng in Kajang Dalam.

This study is the result of the joint research carried out by three lecturers with expertise in differing fields of study, namely, **culture** and history of architecture, occupational health and safety, and environmental architecture.

The research process began by conducting a study of **the literature found in** academic research connected with the Kajang community. This was followed by a field survey of ten objects of study ( i.e. the houses) by sketching **them out drawings** – as photography was strictly forbidden – and by collecting the measurements of each house's dimensions. These were then transferred to the AutoCAD 2D application. Interviews with the inhabitants of the houses, as well as with community members, were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions to the owners of the respective houses included the age of the house, the position of the kitchen and stairs, as well as the **order of the rooms**, along with their importance and usage. The data was then correlated, analysed and discussed.

## 4. Results

**The** sample of ten houses, located in the hamlet of Benteng in the Kajang Dalam area, were **carefully examined** ~~the research objects which are located~~

in the hamlet of Benteng. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three *lura* by two *latte* with a *tala-tala* (an extension) along the back of the building (see figure 2), while two houses were slightly larger in size measuring 3 *lura* by three *latte*, also with a *tala-tala* (see figure 3). Traditional houses in South Sulawesi are not measured using the more well-known modern-day metric system, but using units of measure known as *lura* and *latte* (Kajang) (e.g. a wall can measure two *latte* and two *lontang*).

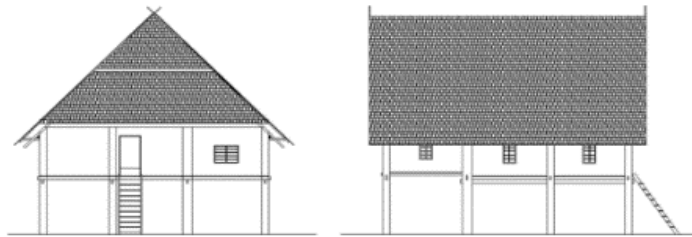


Figure 2. The house measuring three *lura* and two *latte* plus *tala-tala* (sketch: Andi Abidah, 2020).

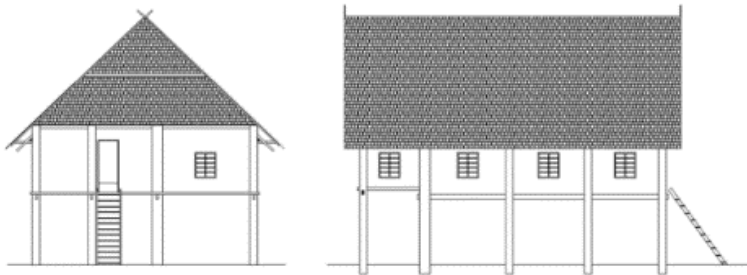


Figure 3. Three *lura* by three *latte* plus *tala-tala* (sketch: Andi Abidah, 2020).

Generally, all houses are designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats. Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations which require them to maintain their simple life (see figure 4).



Figure 4. Traditional lamp (*pelita*: local language). The house is Mustamin. Which the researchers team staying. (photograph: Andi Abidah 2020).

## 5. Discussion

Indonesia's geographical position is on the equator, which means that all islands in the archipelago experience high rainfall and humidity, low wind speed and intense sun, all characteristics of a tropical climate. Each customary dwelling consequently requires a design that incorporates a good amount of ventilation in order to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six-hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors in toto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects, culturally distinct communities, which the Ammatoa Kajang refer to in their language as *ilalang embayya* (inside the fenced area), also known as *rambang seppang* or the Kajang Dalam area, and the *ipantarang embayya* (outside the fenced area), also known as *rambang luara* or the Kajang Luar area S. Aminah [10].

Those who live in the Kajang Luar area effectively **act as a** buffer between those living in the Kajang Dalam area **and the rest of the world**, as they are able to embrace modernity and yet maintain ties to their cultural heritage



because they have chosen to only loosely follow a few of the *Pasang ri Kajang* customs. This can be seen in the *Kajang Luar* community's use of modern tools and equipment to cultivate their land, in the wearing of modern clothing, and **in the interior** of their houses, which are often in appearance not **very** different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the *Kajang Luar*, are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction, cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings as explained by A. Abidah, M. Yahya, and B. A. Rauf [11].

On the other hand, the *Kajang Dalam* community's houses are built entirely out of natural materials. This is in strict obedience to every precept of the *Pasang ri Kajang*, which influences all aspects of daily life including the construction and placement of every thatch-roofed, wood and bamboo home within the environment.

### **5.1. Cultural influences on indigenous dwellings**

The *Ammatoa Kajang* community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in their sacred forest. Certain areas are allocated for the planting of trees to be used for firewood and construction, while fruit-bearing and other productive trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals and is cultivated close to the house by the women. As a result, the *Kajang Dalam* area remains **fresh?/lush?** and green. Nature is an ancestral heritage that needs both its quality and balance to be maintained. The resolution of the *Kajang Dalam* community to preserve their forest and natural surroundings is evident in their firmness in applying their ancestral teachings, called *Pasang ri Kajang* [12]. This approach promotes the necessary balance, enabling this community to live in comfort and harmony with the natural environment, as explained by M. Aarifin, W. Wahidah Osman, and S. Wunas [13].

The houses built within the *Kajang Dalam* area are in strict adherence to all the customary rules including those which deal with all aspects of the form and elements of their stilt homes, such as the size and orientation of each house, the material that may be used for construction, the shape and position of the windows, the location of the kitchen, and the staircase. Even the placement of a house in the *Kajang Dalam* area and its construction are considered a ritualistic rite as Sukman [14] notes. All *Kajang Dalam* houses, as Nurhayati [15] observes, have small dimensions, are simple in form without any ornamentation, and are constructed using similar materials in a

standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun, on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

Traditional houses in Indonesia can be seen to have their design, and especially orientation, influenced by Hindu and Islam, as explained by P.J.M. Nas [16]. Hindu practices forbid houses from being built facing the sunset, as the sun is analogous to life. When Islam started spreading its influence – in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to A. Abidah [17], can also be found in the old settlement of the Soppeng-bugis tribe where formerly North-South oriented houses are now oriented toward Mecca. However, from the 1970's onwards, new settlements were oriented toward the roads (following the regulations of the local government at the time), a practice that continues to the present day.

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo. They are topped with box gable roofs that have a 45-degree pitch and covered with a thatch roof made from *alang-alang* grass (*Imperata Cylindrica* Sp.); strands of this grass are assembled and tied to bamboo sticks to form sheets of a specific size, making the houses much cooler than those in the Kajang Luar area, where zinc is used as a roofing material.

Generally, the walls and floors are constructed with a combination of wood and bamboo, while some houses do not use any bamboo at all. The staircase to the front door, which is centred at the front of the house, is open to the elements, so the wood used for constructing the stairs is of noticeably better quality to withstand weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted lengthwise across the threshold called a *kappa-kappang*.

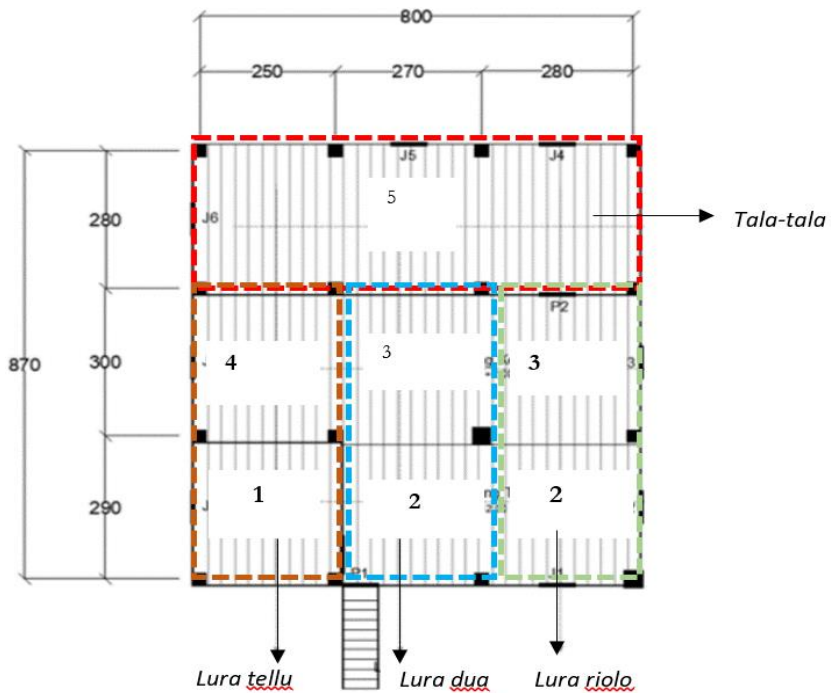
The ten objects of this study were similar in size and shape, as anthropometry is used to set the dimensions of each house, and the terms *lura* for width and *latte* for length are used as measurements. The dimensions of one *lura/latte* are taken using the body of the owner. A *depa* is another measure of length and is the equivalent of the span of one man's body with outstretched arms measured from fingertip to fingertip. A *hasta*, on the other hand, is measured from the elbow to the tip of the middle finger. Anthropometry is commonly used by many indigenous peoples as a way to measure different things. It can include, as P. Oliver [9] explains, the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm, as well as other parts of the body including the torso, each representing a different unit of measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as Z. Zain [18] states, are based on the human body to determine the height of doors, windows, fences and so on.

Furthermore, Balinese house dimensions, as I. M. Bidja [19] states, use the human body to calculate the size and scale of buildings to ensure that a balance between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used [17]. All the study objects also had a *tala-tala*, which is a narrow extension along the back of the house with a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* and had a *tala-tala*, while two houses were wider by a third, at three *lura* by three *latte* with a *tala-tala* along the rear, as shown in figures 5,6,7 and 8.



Figure 5. Lura of house (source: Andi Abidah 2020).



1. Washing area and kitchen
2. Guest room and men's space
3. Family room and women's space
4. Space for preparing food and dining
5. Sleeping room for girls or female guests

Figure 6. Floor plan of the lura and tala-tala (source: Andi Abidah 2020)



Figure 7. Latte or latta of the house (source: Andi Abidah 2020).

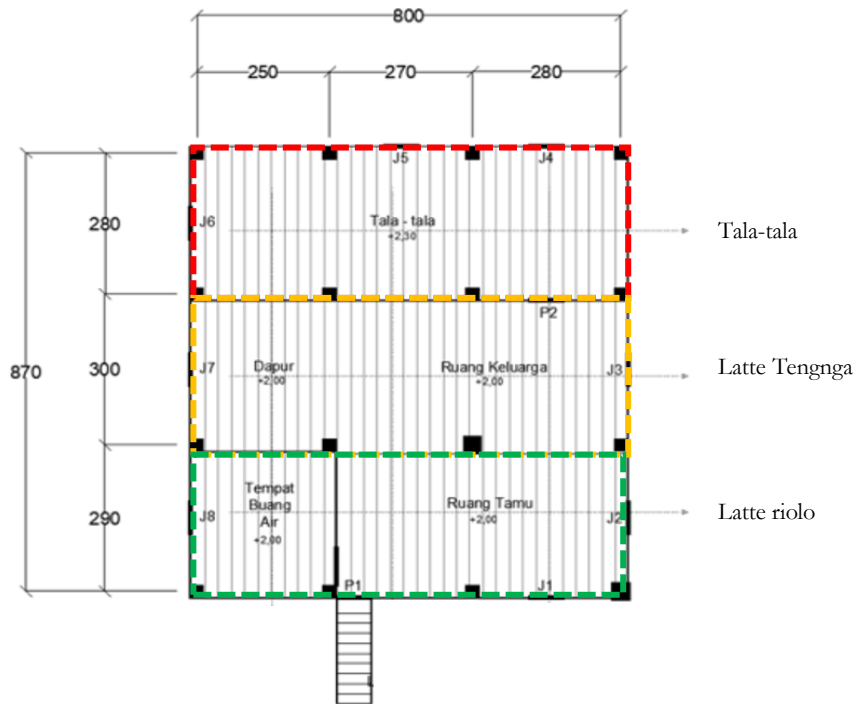


Figure 8. Latte and tala ala in room plan (sketch: Andi Abidah 2020).

The placement of the kitchen is unusual and yet it has remained in this position, unchanged, for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura* of the first *latte* so that it is always visible to guests in the sitting room to the right of the front door, as seen in the floor plans of figures 6 and 8. This indicates the openness of the occupants about their food, as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones, or sometimes simple furnaces, are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, which also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash before going to sleep, as well as a convenient place to urinate at night. By comparison, the kitchen in a Bugis house, as C. Pelras [20] explains, is located in the *lontang*, or in the last part of the house (*lontang* in the Bugis language or *lura* in the Makassar Konjo language / the language of the Kajang). It is rare to have the kitchen situated within the main part of the house in Indonesia, as J. Forshee [21] verifies. This is because Indonesians in remote areas still cook using traditional methods which produce smoke.

Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates, while the *para-para* on the opposite side is used to store floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to Andi Abidah [17], and are referred to as *tanre-tanreang* in Bugis. However, this element is slowly disappearing.

## 5.2. Indigenous techniques to maximize ventilation and light

The customary rules concerning windows allow for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right (see figure 9).



Figure 9. Cross ventilation (sketch: Andi Abidah 2020).

The number three is significant in Ammatoa Kajang culture, so every house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size, but their rectangular shape, style and material were uniform. All windows are fitted with wooden bars, as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in (figures 10 and 11), is unique to Ammatoa Kajang dwellings.

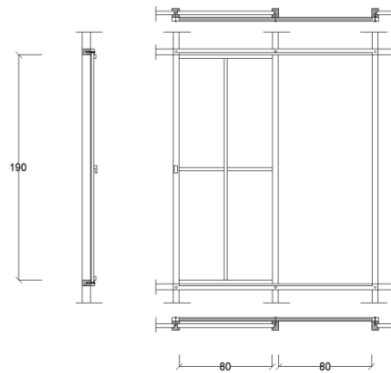


Figure 10. Sliding window model (sketch: Andi Abidah 2020).

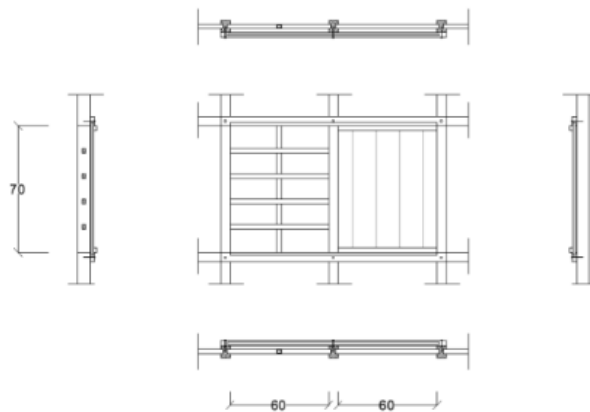


Figure 11. Sliding window model (sketch: Andi Abidah 2020).

Generally, the floor is made of wood and bamboo. Bamboo slats are used in the first and second *latte* while the *tala-tala* has a wooden floor. The flooring throughout each house has **gaps of** approximately one centimetre ~~gaps~~ between each wooden plank and bamboo slat, to allow air circulation even at night, when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to S. Chuki, R. Sarkar, and R. Kurar [22], can be seen in traditional Thai houses that use bamboo, wood planks, and thatch, the difference being that bamboo is used not only in the corridor of the house but also in the construction of the roof to support the thatch.

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, and the density or distance between the dwellings and any other barriers, such as vegetation, that would decrease air quality and flow. The distance between houses is between three to five meters with well-maintained foliage surrounding each house [23]. Furthermore, Dipl. Ing. Y.B. Mangunwijaya [24] observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### 5.3. Indigenous management of clean and black water

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water, positioned at 5°19'27.7" S 120°17'56.5"E, that serves three villages (see figure 12).



*Figure 12. Source of fresh water (source: Internet 2020).*

The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking. In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the left side of the house, then flows into a low area and seeps into the ground.



For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because **the use of** modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meter area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter, dug 2 to 3 meters deep into the ground and covered with two sizeable flat rocks placed with a gap between them for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as F. Boano *et al* [25] explain, which actually receives good marks in terms of environmental and energy profits when such processing systems are integrated into green structures. **Through existing rules, local communities have been applied for generations to maintain and process natural ecosystems towards a continuous environment.**

## 6. Conclusion

Even though the Ammatoa Kajang indigenous community in the Kajang Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the Pasang ri Kajang together with the directives of their customary institutions that regulate the community's interactions with the environment and each other for their physical, mental, and spiritual well-being. The Kajang Dalam residents have sustained a refreshing green environment that flows through their homes where they admit to feeling very comfortable. **The Kajang Dalam peoples concept that each people have to maintain nature to be green. Each people in the area must plant one or two trees after cut one tree. they believe that nature will be angry if they violate customary rules.**

## Acknowledgments

Thanks go to Universitas Negeri Makassar which gave us the opportunity to carry out research in Kajang; funded by DIPA PNBP of the Postgraduate program at Universitas Negeri Makassar. Thanks also go to the communities of Kajang, especially Kajang Dalam.

## Notes

<sup>1</sup> Ammatoa is the local language of the head of customs or leader of the customs of Kajang Dalam; Kajang Dalam area is the area that still preserves its tradition, culture, religion, and has not undergone any moderisation, whereas Kajang Luar is already accepting modernization.

The communities of Kajang Luar area step by step avoid tradition, culture, and religion. [Because of the area be use to electrical lamp, watching tv, and modern material in their home.](#)

<sup>2</sup>The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulse. AMAN (Aliansi Masyarakat Adat Nusantara / Alliance of Indigenous Peoples of the Archipelago).

## References

- [1] Rudi Gunawan, *Rencana Rumah Sehat*. Kanisus.
- [2] R. Waterson, 'The Living House An Antrhropology of Architecture in South-EastAsia', Oxford University Press Pte Ltd, 1990.
- [3] C. Pelras, 'Religion, Tradition and Dynamics of Islamization in South Sulawesi', vol. 29, pp. 107–135, 1985.
- [4] A. Rapoport, 'Culture , Architecture , and Design'.
- [5] Erawati Lewa, 'Arsitektur Rumah Tradisional Suku Kajang di Provinsi Sulawesi Selatan', *Mozaik Hum.*, vol. 18, no. 80–92, pp. 1689–1699, 2018.
- [6] Palembang Nadji (2006) *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar.
- [7] W. Osman, 'Karakteristik dan Aturan Adat pada Tatahan Rumah Tinggal dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.', Tesis Jurusan Teknik Arsitektur ITS. Surabaya, 2000.
- [8] Gallahue, D.L., Ozmun, J.C. (1998) *Understanding Motor Development Infant Children, Adolescent, Adults*. USA: Mac Graw Hill Company.
- [9] P. Oliver, Ed., 'Theories and Principles' (1997) in *Encyclopedia of Vernacular Architecture of the World*, The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Cambridge University Press, 1997, pp. 6–15.
- [10] S. Aminah, *Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang*. Depatement P & K Sulawesi Selatan, 1989.
- [11] A. Abidah, M. Yahya, and B. A. Rauf, 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants', pp. 446–448.
- [12] I. H. Darmawan, 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba', Universitas Islam Negeri Alauddin Makassar, 2019.
- [13] Mimi. Aarifin. Wiwik Wahidah Osman, Shirly Wunas, 'Struktur Kawasan Permukiman Ammatoa Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang', *lplbi*, no. 1, pp. 127–130, 2016.
- [14] Sukman, 'Arsitektur Vernakular Ammatoa Kajang di Sulawesi

- Selatan', Universitas Gaja Mada, 1993.
- [15] Nurhayati, 'Karakteristik Rumah tinggal Tradisional kawasan Ammatoa Kajang', UNHAS, 2000.
- [16] P. J.M.Nas, 'The house in Indonesia Between globalization and localization', *Bijdr. tot Taal-, Land- en Volkenkd.*, vol. 2, pp. 335–360, 1998.
- [17] A. Abidah, 'Nobel and Commoner Bugis houses in the regency of Soppeng South Sulawesi, Indonesia', Vienna University of Technology, 2019.
- [18] Z. Zain, 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan', Technische Universität Wien, 2012.
- [19] I. M. Bidja, *Asta Kosala-Kosali Asta Bumi*. PB, 2000.
- [20] C. Pelras, 'Bugis and Makassar Houses Variation and evolution', in *Indonesian houses*, R. Schefold, G. Domenig, and P. J.M.Nas, Eds. Singapore: SUP Singapore University Press, 2004, pp. 251–281.
- [21] J. Forshee, *Culture and Customs of Indonesia.*, Culture an. London: British Library Cataloguing, 2006.
- [22] S. Chuki, R. Sarkar, and R. Kurar, 'A Review on Traditional Architecture Houses in Buddhist Culture', *Am. J. Civ. Eng. Archit.*, vol. 5, no. 3, pp. 113–123, 2017.
- [23] T. E. Swasti, 'Pengaruh Kerapatan Bangunan pada Karakteristik Termal Rumah Tinggal Kampung Naga terhadap Kenyamanan Penghuni', *J. Arsitektur, Bangunan, Lingkungan.*, vol. 5, no. 2, pp. 83–90, 2016.
- [24] Dipl. Ing. Y.B Mangun Wijaya, *Pengantar Fisika Bangunan*. Penerbit Djambatan, 1988.
- [25] F. Boano *et al.*, 'A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits', *Sci. Total Environ.*, vol. 711, p. 134731, 2020.

## Biographical Notes

**Andi Abidah** finished her doctoral studies at the Institute of Building History and Building Archaeology at TU Wien, Austria. **She** studied Urban Design in **her** Magister's degree **from the** Institute of Technology at Bandung, Indonesia. **She obtained her bachelor's degree** in architecture at the University of Hasanuddin, Indonesia. She is currently head of the architecture study program at the Universitas Negeri Makassar, Indonesia. Her interests include research **on** the history and culture of architecture and urban heritage, particularly in ancient historical cities.

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### **Summary**

Even today, there are communities of indigenous peoples in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed; they take into consideration where and how their houses are built, and the effects of their dwellings on the physiology of the occupants, as well as the social, spiritual and cultural relations within their community, **well-integrated into** their system of beliefs and their environment. One of these indigenous communities that lives this way of life and has shunned all forms of modernization, is the Ammatoa Kajang, who inhabit a remote area of the South Sulawesi province. Their traditional homes, even today, are built adhering to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community.



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**paper submission Conservation Science in Cultural Heritage**

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28 December 2021 at 16:57

To: "ANDI ABIDAH, ST, MT UNM" &lt;andi.abidah@unm.ac.id&gt;

Dear Dr. Andi Abidah,

Thank you for your revised paper.

The final corrections have been made and everything now seems to be in order, so it is the final version.

I am attaching it for you to check.

Please let me know if you need to make any final changes or not, otherwise this version is the one that will be published.

Thank you

Have a good day.

Kind regards

Angela Mari Braid

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# THE HEALTHY HOMES OF THE AMMATOA KAJANG INDIGENOUS PEOPLE, INDONESIA

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*Keywords:* traditional dwellings, healthy home, indigenous people, culture

## **1. Introduction**

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols, such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia, traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO), where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live, and their physical and mental health, has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken, so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment, as well as its maintenance. Further, Rudi [1] states that a healthy house should have clean water available, with good

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plumbing and sanitation systems to deal with clean and dirty water, be well lit and have good cross ventilation.

The temperature and humidity of the room should also be adequate, as they can affect the comfort and health of the occupants. Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C - 30°C with humidity between 40% and 70% to ensure the comfort of its occupants, and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years, like the *Ammatoa Kajang* indigenous peoples, who have separated themselves from all forms of modernization.

The Ammatoa Kajang<sup>1</sup> reside on their ancestral lands of 22689.59 hectares<sup>2</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas, namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as *rambang seppang* – which covers over 552 hectares, and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area), also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life, as set by their oral precepts, sayings and principles, collectively referred to as the *Pasang ri Kajang*, while residents of the Kajang Luar have embraced most, if not all, forms of modernity.

The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives, such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must be used, how rituals and traditions should be practiced, and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built according to the informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar, and Mandar indigenous peoples of Sulawesi island having floors raised about 180 - 200 centimeters from the ground, as reported by Roxana Waterson [2]. The "H-shaped" frames for the structure of the Bugis and Makassar houses that do not use pegs or nails in their construction, as C. Pelras [3] explains, are commonly found throughout Southeast Asia.

However, it is Amos Rapoport [4] who observes that tradition, custom and culture influence the Kajang Dalam houses's orientation, as well as house shape and other aspects of house design. Passed down from generation to generation, every part of the house, including certain elements that are applied, has been given meaning, even in the case of recently built houses in the Kajang Dalam customary area. The form of customary Ammatoa Kajang house is divided vertically into three parts, namely, the upper level or attic, locally referred to as *pammakkang / rakkeang*, below which is the body of the house called *kale ballak*, and then beneath the house is an open space which is called *awasao / siring*, as Erawati Lewa explains [5] (see figure 1).

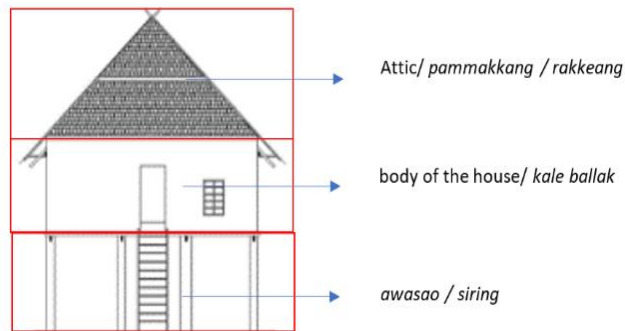


Figure 1. Vertical parts of the home (sketch: Andi Abidah 2020).

The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as a living space for the occupants to carry out their daily activities, while the open area under the house is used to keep agricultural tools, as well as livestock, such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to Palemmui Nadji [6] also consist of three vertical parts, namely, the attic, the body of the house and the area under the house. The attic (*rakkeang*) is the upper level, which the Bugis indigenous people consider to be a sacred space; the middle part, the body of the house (*alebola*), is used as an area to carry out daily activities, and the lower part (*wasaubola*) is considered to be a “dirty” space (i.e. a space to put work clothes after they have been used for working in the fields and garden, and a space for chickens and ducks, and also guard-dogs).

The orientation of the house determines the amount of sunlight and air entering it, as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses' traditional structure, W. Osman [7] notes that their houses are now oriented toward the road, while the Kajang Dalam maintain their houses' orientation facing west, with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider



that will ensure a healthy home include building materials, room size, and waste disposal. Moreover, Gallahue, D.L. and J.C. Ozmun [8] observe that temperature, climate and ceiling height also physiologically impact the occupants; such careful consideration of these elements can be seen in Kajang Dalam homes.

## **2. Objective**

The deep mental, spiritual and cultural connection the Kajang Dalam have with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these homes influence the physiology of their occupants.

## **3. Methods**

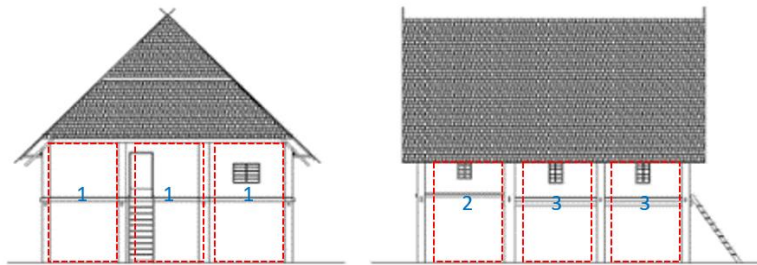
The research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour, as highlighted by P. Olive [9]. This is so that the extent of a dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng in Kajang Dalam.

This study is the result of the joint research carried out by three lecturers with expertise in differing fields of study, namely, culture and history of architecture, occupational health and safety, and environmental architecture.

The research process began by conducting a study of the literature found in academic research connected with the Kajang community. This was followed by a field survey of ten objects of study (i.e. the houses) by sketching them, as photography was strictly forbidden and by collecting the measurements of each house's dimensions. These were then transferred to the AutoCAD 2D application. Interviews with the inhabitants of the houses, as well as with community members, were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions put to the owners of the respective houses included the age of the house, the position of the kitchen and stairs, as well as the order of the rooms, along with their importance and usage. The data was then correlated, analysed and discussed.

## **4. Results**

The sample of ten houses, located in the hamlet of Benteng in the Kajang Dalam area, were carefully examined. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three *lura* by two *latte* with a *tala-tala* (an extension) along the back of the building (see figure 2), while two houses were slightly larger in size measuring 3 *lura* by three *latte*, also with a *tala-tala* (see figure 3). Traditional houses in South Sulawesi are not measured using the more well-known modern-day metric system but using units of measure known as *lura* and *latte* (Kajang) (the module/width of a house is measured in *lura/lurak* and the length is measured in *latte*). The majority of houses use three *lura* and two or three *latte* and no more.



1. Lurak/lura
2. Tala-tala
3. Latte/latte

Figure 2. The house measuring three *lura* and two *latte* plus *tala-tala* (sketch: Andi Abidah, 2020).

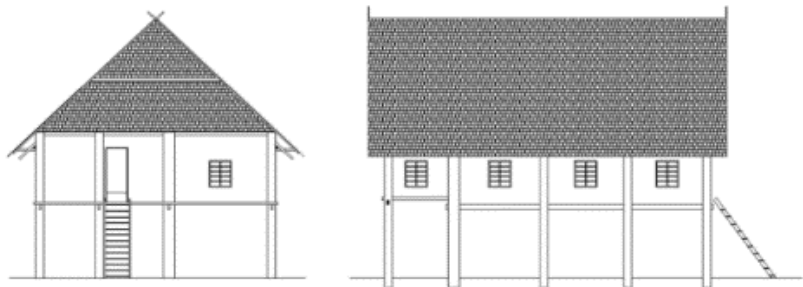


Figure 3. Three *lura* by three *latte* plus *tala-tala* (sketch: Andi Abidah, 2020).

Generally, all houses are designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats. Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations which require them to maintain a simple life (see figure 4).



*Figure 4. Traditional lamp (pelita: local language). Mustamin's house (photograph: Andi Abidah 2020).*

## **5. Discussion**

Indonesia's geographical position is on the equator, which means that all islands in the archipelago experience high rainfall and humidity, low wind speed and intense sun, all characteristics of a tropical climate. Each customary dwelling consequently requires a design that incorporates a good amount of ventilation in order to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six-hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors in toto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects, culturally distinct communities, which the Ammatoa Kajang refer to in their

language as *ilalang embayya* (inside the fenced area), also known as *rambang seppang* or the Kajang Dalam area, and the *ipantarang embayya* (outside the fenced area), also known as *rambang luara* or the Kajang Luar area [10].

Those who live in the Kajang Luar area effectively act as a buffer between those living in the Kajang Dalam area and the rest of the world, as they are able to embrace modernity and yet maintain ties to their cultural heritage because they have chosen to only loosely follow a few of the Pasang ri Kajang customs. This can be seen in the Kajang Luar community's use of modern tools and equipment to cultivate their land, in the wearing of modern clothing, and in the interior of their houses, which are often in appearance not very different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the Kajang Luar, are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction, cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings as explained by A. Abidah, M. Yahya, and B. A. Rauf [11].

On the other hand, the Kajang Dalam community's houses are built entirely out of natural materials This is in strict obedience to every precept of the Pasang ri Kajang, which influences all aspects of daily life including the construction and placement of every thatch-roofed, wood and bamboo home within the environment.

### **5.1. Cultural influences on indigenous dwellings**

The Ammatoa Kajang community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in their sacred forest. Certain areas are allocated for the planting of trees to be used for firewood and construction, while fruit-bearing and other productive trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals and is cultivated close to the house by the women. As a result, the Kajang Dalam area remains lush and green. Nature is an ancestral heritage that needs both its quality and balance to be maintained. The resolution of the Kajang Dalam community to preserve their forest and natural surroundings is evident in their firmness in applying their ancestral teachings, called *Pasang ri Kajang* [12]. This approach promotes the necessary balance, enabling this community to live in comfort and harmony with the natural environment, as explained by M. Aarifin, W. Wahidah Osman and S. Wunas [13].

The houses built within the Kajang Dalam area are in strict adherence to all the customary rules including those which deal with all aspects of the form

and elements of their stilt homes, such as the size and orientation of each house, the material that may be used for construction, the shape and position of the windows, the location of the kitchen, and the staircase. Even the placement of a house in the Kajang Dalam area and its construction are considered a ritualistic rite as Sukman notes [14]. All Kajang Dalam houses, as Nurhayati [15] observes, have small dimensions, are simple in form without any ornamentation, and are constructed using similar materials in a standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun, on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

Traditional houses in Indonesia can be seen to have their design, and especially orientation, influenced by Hindu and Islam, as explained by P.J.M. Nas [16]. Hindu practices forbid houses from being built facing the sunset, as the sun is analogous to life. When Islam started spreading its influence – in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to A. Abidah [17], can also be found in the old settlement of the Soppeng-bugis tribe where formerly North-South oriented houses are now oriented toward Mecca. However, after Indonesia's independence and from the 1970's on, new settlements in the Regency of Soppeng no longer followed this rule of orientation according to culture, tradition and beliefs, they followed local government regulations (each Regency has a mayor or regent). This meant that houses had to be oriented toward the road, except in the case of tribes who did not accept modernization, such as the Kajang Dalam.

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo. They are topped with box gable roofs that have a 45-degree pitch and covered with a thatch roof made from cogon grass (*Imperata Cylindrica* Sp.); strands of this grass are assembled and tied to bamboo sticks to form sheets of a specific size, making the houses much cooler than those in the Kajang Luar area, where zinc is used as a roofing material.

Generally, the walls and floors are constructed with a combination of wood and bamboo, while some houses do not use any bamboo at all. The staircase to the front door, which is centred at the front of the house, is open to the elements, so the wood used for constructing the stairs is of noticeably better quality to withstand weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted lengthwise across the threshold called a *kappa-kappang*.

The ten objects of this study were similar in size and shape, as anthropometry is used to set the dimensions of each house, and the terms *lura* for width and *latte* for length are used as measurements. The dimensions of one *lura/latte* are taken using the body of the owner. A *depa* is another measure of length and is the equivalent of the span of one man's body with

outstretched arms measured from fingertip to fingertip. A *hasta*, on the other hand, is measured from the elbow to the tip of the middle finger. Anthropometry is commonly used by many indigenous peoples as a way to measure different things. It can include, as P. Oliver [9] explains, the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm, as well as other parts of the body including the torso, each representing a different unit of measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as Z. Zain [18] states, are based on the human body to determine the height of doors, windows, fences and so on. Furthermore, Balinese house dimensions, as I. M. Bidja [19] states, use the human body to calculate the size and scale of buildings to ensure that a balance between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used [17]. All the study objects also had a *tala-tala*, which is a narrow extension along the back of the house with a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* and had a *tala-tala*, while two houses were wider by a third, at three *lura* by three *latte* with a *tala-tala* along the rear, as shown in figures 5,6,7 and 8.

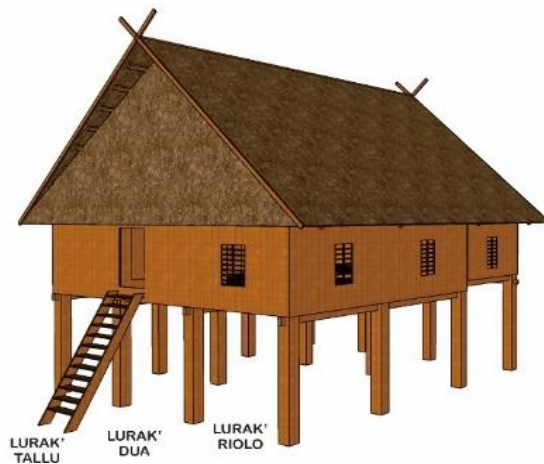
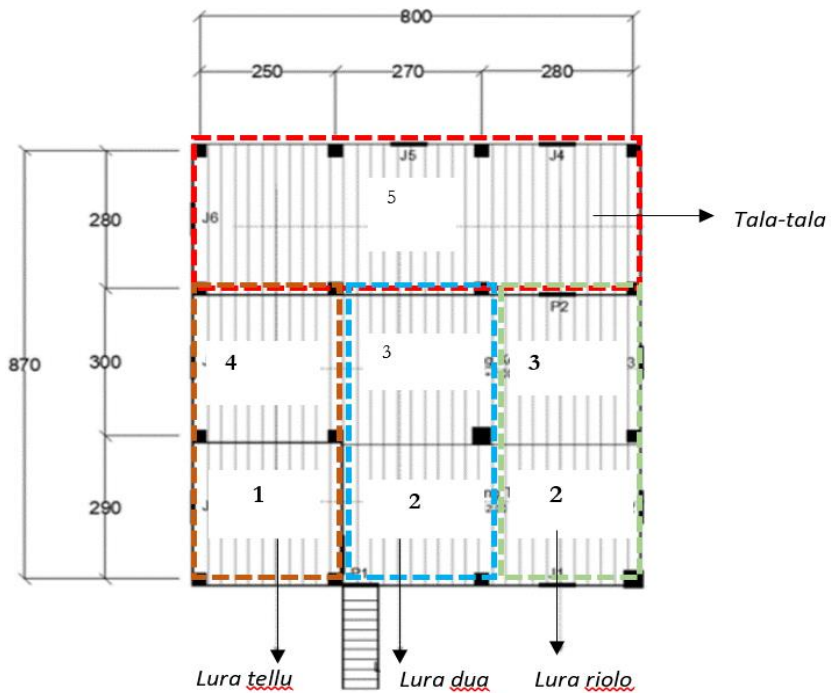


Figure 5. *Lura/lurak'* of house (source: Andi Abidah 2020).



1. Washing area and kitchen
2. Guest room and men's space
3. Family room and women's space
4. Space for preparing food and dining
5. Sleeping room for girls or female guests

Figure 6. Floor plan of the lura and tala-tala (source: Andi Abidah 2020)



Figure 7. Latte or latta' of the house (source: Andi Abidah 2020).

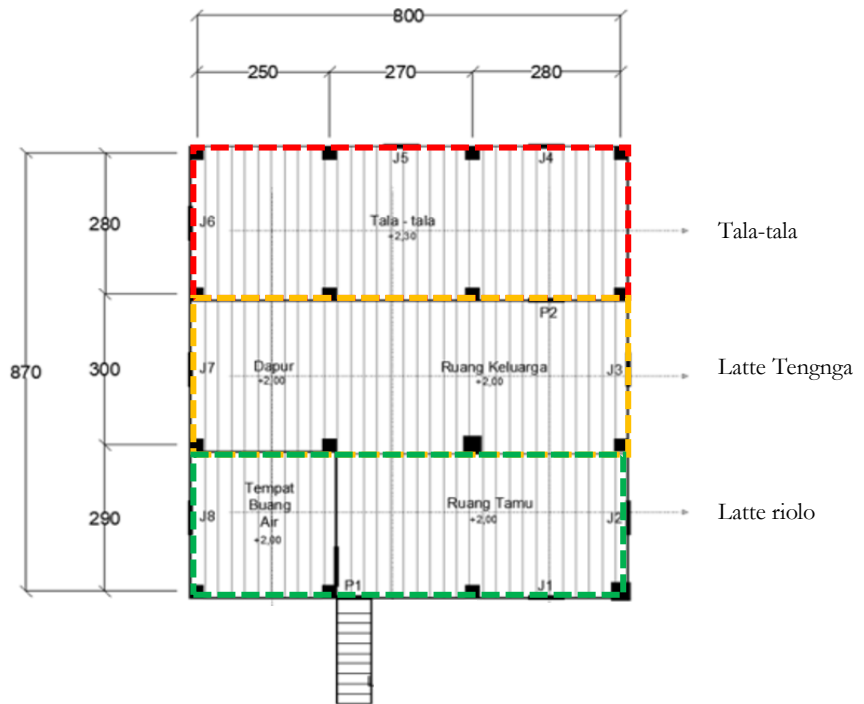


Figure 8. Latte and tala-tala in room plan (sketch: Andi Abidah 2020).

The placement of the kitchen is unusual and yet it has remained in this position, unchanged, for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura / lurak* of the first *latte* so that it is always visible to guests in the sitting room to the right of the front door, as seen in the floor plans of figures 6 and 8. This indicates the openness of the occupants about their food, as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones, or sometimes simple furnaces, are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, which also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash before going to sleep, as well as a convenient place to urinate at night. By comparison, the kitchen in a Bugis house, as C. Pelras [20] explains, is located in the *lontang*, or in the last part of the house (*lontang* in the Bugis language or *lura / lurak* in the Makassar Konjo language / the language of the Kajang). It is rare to have the kitchen situated within the main part of the house in Indonesia, as J. Forshee [21] verifies. This is because Indonesians in remote areas still cook using traditional methods which produce smoke.



Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates, while the *para-para* on the opposite side is used to store floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to Andi Abidah [17], and are referred to as *tanre-tanreang* in Bugis. However, this element is slowly disappearing.

## 5.2. Indigenous techniques to maximize ventilation and light

The customary rules concerning windows allow for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right of the door (see figure 9).



Figure 9. Cross ventilation (sketch: Andi Abidah 2020).

The number three is significant in Ammatoa Kajang culture, so every house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size, but their rectangular shape, style and material were uniform. All windows are fitted with wooden bars, as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in (figures 10 and 11), is unique to Ammatoa Kajang dwellings.

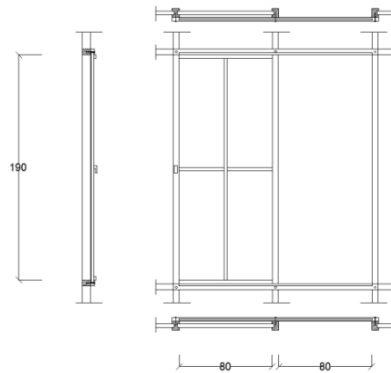


Figure 10. Sliding window model (sketch: Andi Abidah 2020).

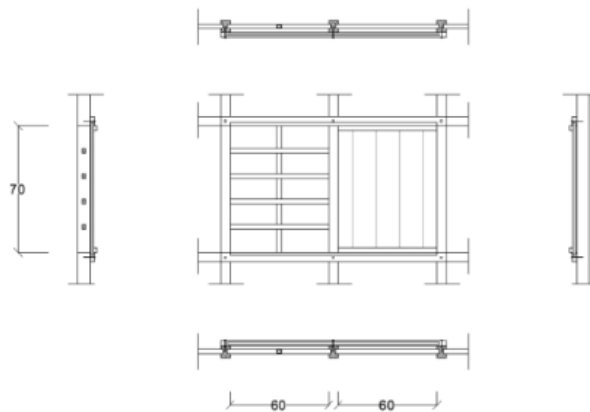


Figure 11. Sliding window model (sketch: Andi Abidah 2020).

Generally, the floor is made of wood and bamboo. Bamboo slats are used in the first and second *latte* while the *tala-tala* has a wooden floor. The flooring throughout each house has gaps of approximately one centimetre between each wooden plank and bamboo slat, to allow air circulation also at night, when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to S. Chuki, R. Sarkar, and R. Kurar [22], can be seen in traditional Thai houses that use bamboo, wood planks, and thatch, the difference being that bamboo is used not only in the corridor of the house but also in the construction of the roof to support the thatch.

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, and the density or distance between the dwellings and any other barriers, such as vegetation, that would decrease air quality and flow. The distance between houses is between three to five meters with well-maintained foliage surrounding each house [23]. Furthermore, Dipl. Ing. Y.B. Mangunwijaya [24] observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### 5.3. Indigenous management of clean and black water

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water, positioned at 5°19'27.7" S 120°17'56.5"E, that serves three villages (see figure 12).



*Figure 12. Source of fresh water (source: Internet 2020).*

The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking. In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the left side of the house, then flows into a low area and seeps into the ground.

For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because the use of modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meter area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter, dug 2 to 3 meters deep into the ground and covered with two sizeable flat rocks placed with a gap between them for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as F. Boano *et al* [25] explain, which actually receives good marks in terms of environmental and energy advantages when such processing systems are integrated into green structures.

## 6. Conclusion

Even though the Ammatoa Kajang indigenous community in the Kajang Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the Pasang ri Kajang together with the directives of their customary institutions that regulate the community's interactions with the environment and each other for their physical, mental, and spiritual well-being. The Kajang Dalam residents have maintained and sustained the natural environment, which provides them with many necessary elements for their daily living. Their houses, where they admit to living comfortably, are constructed with materials that are readily available from their surroundings. They have a symbiotic relationship with nature, as what they take from the environment is given back, for example, by planting one or two trees when one has been cut down; this is also because the Kajang Dalam peoples believe that nature will be angry if they violate any of their customary rules.

## Acknowledgments

Thanks go to Universitas Negeri Makassar which gave us the opportunity to carry out research in Kajang; funded by DIPA PNBP of the Postgraduate program at Universitas Negeri Makassar. Thanks also go to the communities of Kajang, especially Kajang Dalam.

## Notes

<sup>1</sup> Ammatoa is the local language of the head of customs or leader of the customs of Kajang Dalam; Kajang Dalam area is the area that still preserves its tradition, culture, religion, and has not undergone any modernisation, whereas Kajang Luar is already accepting modernization. The communities of Kajang Luar area step by step avoid tradition, culture,

and religion. They are already accepting modernization and do not follow the rule of Ammatoa in Kajang Dalam.

<sup>2</sup> The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulsel. AMAN (Aliansi Masyarakat Adat Nusantara / Alliance of Indigenous Peoples of the Archipelago).

## References

- [1] Rudi Gunawan, *Rencana Rumah Sehat*. Kanisus.
- [2] R. Waterson, 'The Living House An Antrhropology of Architecture in South-EastAsia', Oxford University Press Pte Ltd, 1990.
- [3] C. Pelras, 'Religion, Tradition and Dynamics of Islamization in South Sulawesi', vol. 29, pp. 107–135, 1985.
- [4] A. Rapoport, 'Culture , Architecture , and Design'.
- [5] Erawati Lewa, 'Arsitektur Rumah Tradisional Suku Kajang di Provinsi Sulawesi Selatan', *Mozaik Hum.*, vol. 18, no. 80–92, pp. 1689–1699, 2018.
- [6] Palemui Nadji (2006) *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar.
- [7] W. Osman, 'Karakteristik dan Aturan Adat pada Tataan Rumah Tinggal dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.', Tesis Jurusan Teknik Arsitektur ITS. Surabaya, 2000.
- [8] Gallahue, D.L., Ozmun, J.C. (1998) *Understanding Motor Development Infant Children, Adolescent, Adults*. USA: Mac Graw Hill Company.
- [9] P. Oliver, Ed., 'Theories and Principles' (1997) in *Encyclopedia of Vernacular Architecture of the World*, The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Cambridge University Press, 1997, pp. 6–15.
- [10] S. Aminah, *Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang*. Depatemen P & K Sulawesi Selatan, 1989.
- [11] A. Abidah, M. Yahya, and B. A. Rauf, 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants', pp. 446–448.
- [12] I. H. Darmawan, 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba', Universitas Islam Negeri Alauddin Makassar, 2019.
- [13] Mimi. Aarifin. Wiwik Wahidah Osman, Shirly Wunas, 'Struktur Kawasan Permukiman Ammatoa Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang', *lpbi*, no. 1, pp. 127–130, 2016.
- [14] Sukman, 'Arsitektur Vernakular Ammatoa Kajang di Sulawesi Selatan', Universitas Gaja Mada, 1993.
- [15] Nurhayati, 'Karakteristik Rumah tinggal Tradisional kawasan

- Ammatoa Kajang', UNHAS, 2000.
- [16] P. J.M.Nas, 'The house in Indonesia Between globalization and localization', *Bijdr. tot Taal-, Land- en Volkenkd.*, vol. 2, pp. 335–360, 1998.
- [17] A. Abidah, 'Nobel and Commoner Bugis houses in the regency of Soppeng South Sulawesi, Indonesia', Vienna University of Technology, 2019.
- [18] Z. Zain, 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan', Technische Universität Wien, 2012.
- [19] I. M. Bidja, *Asta Kosala-Kosali Asta Bumi*. PB, 2000.
- [20] C. Pelras, 'Bugis and Makassar Houses Variation and evolution', in *Indonesian houses*, R. Schefold, G. Domenig, and P. J.M.Nas, Eds. Singapore: SUP Singapore University Press, 2004, pp. 251–281.
- [21] J. Forshee, *Culture and Customs of Indonesia.*, Culture an. London: British Library Cataloguing, 2006.
- [22] S. Chuki, R. Sarkar, and R. Kurar, 'A Review on Traditional Architecture Houses in Buddhist Culture', *Am. J. Civ. Eng. Archit.*, vol. 5, no. 3, pp. 113–123, 2017.
- [23] T. E. Swasti, 'Pengaruh Kerapatan Bangunan pada Karakteristik Termal Rumah Tinggal Kampung Naga terhadap Kenyamanan Penghuni', *J. Arsitektur, Bangunan, Lingkung.*, vol. 5, no. 2, pp. 83–90, 2016.
- [24] Dipl. Ing. Y.B Mangun Wijaya, *Pengantar Fisika Bangunan*. Penerbit Djambatan, 1988.
- [25] F. Boano *et al.*, 'A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits', *Sci. Total Environ.*, vol. 711, p. 134731, 2020.

## Biographical notes

**Andi Abidah** finished her doctoral studies at the Institute of Building History and Building Archaeology at TU Wien, Austria. She studied Urban Design in her Magister's degree from the Institute of Technology at Bandung, Indonesia. She obtained her bachelor's degree in architecture at the University of Hasanuddin, Indonesia. She is currently head of the architecture study program at the Universitas Negeri Makassar, Indonesia. Her interests include research on the history and culture of architecture and urban heritage, particularly in ancient historical cities.

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degree in the field of architecture. His research interest is mainly in the field of architecture and environmental education.

### **Summary**

Even today, there are communities of indigenous peoples in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed; they take into consideration where and how their houses are built, and the effects of their dwellings on the physiology of the occupants, as well as the social, spiritual and cultural relations within their community, well-integrated into their system of beliefs and their environment. One of these indigenous communities that lives this way of life and has shunned all forms of modernization, is the Ammatoa Kajang, who inhabit a remote area of the South Sulawesi province. Their traditional homes, even today, are built adhering to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community.



healthy homes



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- Inbox** 74
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**ANDI ABIDAH, ST, MT UNM** <andi.abidah@unm.ac.id>  
to A

30 Jan 2022, 09:49

Dear  
Angelina Mari Braidia

I am sorry, for the late answer to your mail. few weeks I have to work on the national accreditation of the Architecture Progra  
few words were added to the paper.

the file in the attachment.

Warm Regards from Indonesia,  
Bida.

**Dr.techn. Andi Abidah, S.T., M.T**

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# **T**HE HEALTHY HOMES OF THE AMMATOA KAJANG INDIGENOUS PEOPLE, INDONESIA

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*Keywords:* traditional dwellings, healthy home, indigenous people, culture

## **1. Introduction**

At the moment, the world community is dealing with COVID-19, which is transmitted through droplets from people who carry the virus. As a result, health protocols, such as staying at home, maintaining a healthy lifestyle, washing hands with water, using hand sanitizer, wearing masks and social distancing have been initiated by governments all over the world. Even in Indonesia, traditional remote settlements have implemented COVID-19 prevention standards of the World Health Organization (WHO), where clean water is placed outside homes to wash hands, face and feet before entering.

It has only been relatively recently – just over the last one hundred years – that the connection between the buildings where people live, and their physical and mental health, has been linked scientifically. According to the WHO (2001), a home can be said to be healthy when a physiological approach to its construction is taken, so that techniques are used that manage risk factors that take into account a house's orientation, location and adaptation to the environment, as well as its maintenance. Further, Rudi [1] states that a healthy house should have clean water available, with good

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plumbing and sanitation systems to deal with clean and dirty water, be well lit and have good cross ventilation.

The temperature and humidity of the room should also be adequate, as they can affect the comfort and health of the occupants. Indonesia's Ministry of Health states in its decree (829/Menkes/SK/VII/1999) concerning healthy homes that interior living spaces should maintain a temperature range of 18°C - 30°C with humidity between 40% and 70% to ensure the comfort of its occupants, and sets the maximum parameters for air exchange rates to ensure occupant health.

All these parameters for housing have been known and practiced by indigenous peoples who continue today to live their lives as their ancestors have for hundreds of years, like the *Ammatoa Kajang* indigenous peoples, who have separated themselves from all forms of modernization.

The Ammatoa Kajang<sup>1</sup> reside on their ancestral lands of 22689.59 hectares<sup>2</sup> in the Bulukumba regency of South Sulawesi province and have separated into two geographically distinct areas, namely those living in the Kajang Dalam (Inner Kajang) customary area – locally referred to in their language, Makassar Konjo, as *ilalang embayya* (inside the fenced area) also known as *rambang seppang* – which covers over 552 hectares, and those living in the Kajang Luar (Outer Kajang) customary area – referred to as the *ipantarang embayya* (outside the fenced area), also known as *rambang luara*. The Kajang Dalam area is where the community maintains all aspects of their heritage, beliefs and way of life, as set by their oral precepts, sayings and principles, collectively referred to as the *Pasang ri Kajang*, while residents of the Kajang Luar have embraced most, if not all, forms of modernity.

The *Pasang ri Kajang* has been handed down from the first Ammatoa or community leader (Ammatoa Riolo) and governs how the Ammatoa Kajang community lives, such as their highly detailed multi-levelled system of governance (customary institutions), the type and colour of clothing that is permitted to be made and worn, how different areas of land must be used, how rituals and traditions should be practiced, and all aspects of housing construction.

The houses within the Kajang Dalam area are strikingly similar and built according to the informal oral transfer of knowledge and customary compliance methods of the *Pasang ri Kajang* to maintain the natural environment. Their stilt houses are, in fact, similar in shape to those of the Bugis, Makassar, and Mandar indigenous peoples of Sulawesi island having floors raised about 180 - 200 centimeters from the ground, as reported by Roxana Waterson [2]. The "H-shaped" frames for the structure of the Bugis and Makassar houses that do not use pegs or nails in their construction, as C. Pelras [3] explains, are commonly found throughout Southeast Asia.

However, it is Amos Rapoport [4] who observes that tradition, custom and culture influence a house, like the Kajang Dalam houses's orientation, as well as house shape and other aspects of house design. Passed down from generation to generation, every part of the house, including certain elements that are applied, has been given meaning, even in the case of recently built houses in the Kajang Dalam customary area. The form of customary Ammatoa Kajang house is divided vertically into three parts, namely, the upper level or attic, locally referred to as *pammakkang / rakkeang*, below which is the body of the house called *kale ballak*, and then beneath the house is an open space which is called *awasao / siring*, as Erawati Lewa [5] explaining (see figure 1).

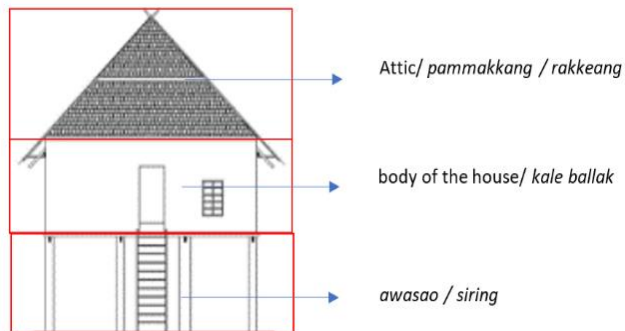


Figure 1. Vertical parts of the home (sketch: Andi Abidah 2020).

The attic functions as storage for dry goods such as rice, corn and beans. The body of the house functions as a living space for the occupants to carry out their daily activities, while the open area under the house is used to keep agricultural tools, as well as livestock, such as chickens, ducks, cows, buffalo and horses. This parallels Bugis houses, which according to Palemmui Nadji [6] also consist of three vertical parts, namely, the attic, the body of the house and the area under the house. The attic (*rakkeang*) is the upper level, which the Bugis indigenous people consider to be a sacred space; the middle part, the body of the house (*alebola*), is used as an area to carry out daily activities, and the lower part (*wasaubola*) is considered to be a “dirty” space (i.e. a space to put work clothes after they have been used for working in the fields and garden, and a space for chickens and ducks, and also guard-dogs).

The orientation of the house determines the amount of sunlight and air entering it, as natural light and ventilation are essential for a healthy house. Although the Bugis and Makassar indigenous peoples have generally maintained their houses' traditional structure, W. Osman [7] notes that their houses are now oriented toward the road, while the Kajang Dalam maintain their houses' orientation facing west, with the rear of each house facing the sunrise.

In addition to natural lighting and ventilation, other essentials to consider that will ensure a healthy home include building materials, room size, and waste disposal. Moreover, Gallahue, D.L. and J.C. Ozmun [8] observe that temperature, climate and ceiling height also physiologically impact the occupants; such careful consideration of these elements can be seen in Kajang Dalam homes.

## **2. Objective**

The deep mental, spiritual and cultural connection the Kajang Dalam have with their environment, their community, and their beliefs are shaped by their strict adherence to the customary rules passed down orally by their ancestors in the *Pasang ri Kajang*. This research examines how these precepts are embodied in the dwellings of the Kajang Dalam community and how these homes influence the physiology of their occupants.

## **3. Methods**

The research was conducted in the field using qualitative methods with anthropological approaches which investigate culture, beliefs and behaviour, as highlighted by P. Olive [9]. This is so that the extent of a dweller's physiological comfort within the Kajang Dalam community may be accurately examined. The research area is located within the Inner Kajang (Kajang Dalam) customary area in the Bulukumba district. The distance from the province's capital to the research location is about 190.4 km. The number of research samples is ten houses located in the village of Benteng in Kajang Dalam.

This study is the result of the joint research carried out by three lecturers with expertise in differing fields of study, namely, culture and history of architecture, occupational health and safety, and environmental architecture.

The research process began by conducting a study of the literature found in academic research connected with the Kajang community. This was followed by a field survey of ten objects of study (i.e. the houses) by sketching them, as photography was strictly forbidden and by collecting the measurements of each house's dimensions. These were then transferred to the AutoCAD 2D application. Interviews with the inhabitants of the houses, as well as with community members, were also conducted using the local language, Makassar Konjo. In this case, the researchers were assisted by translators from the local community who understood this local dialect and spoke Indonesian. Some of the questions put to the owners of the respective houses included the age of the house, the position of the kitchen and stairs, as well as the order of the rooms, along with their importance and usage. The data was then correlated, analysed and discussed.

## **4. Results**

The sample of ten houses, located in the hamlet of Benteng in the Kajang Dalam area, were carefully examined. The survey results showed that the houses were generally similar in form. Eight of the houses were of similar dimensions measuring three *lura* by two *latte* with a *tala-tala* (an extension) along the back of the building (see figure 2), while two houses were slightly larger in size measuring 3 (three) *lura* by three *latte*, also with a *tala-tala* (see figure 3). Traditional houses in South Sulawesi are not measured using the more well-known modern-day metric system but using units of measure known as *lura* and *latte* (Kajang) (the module/width of a house is measured in *lura/lurak* and the length is measured in *latta*). The majority of houses use three *lura* and two or three *latte* and no more.

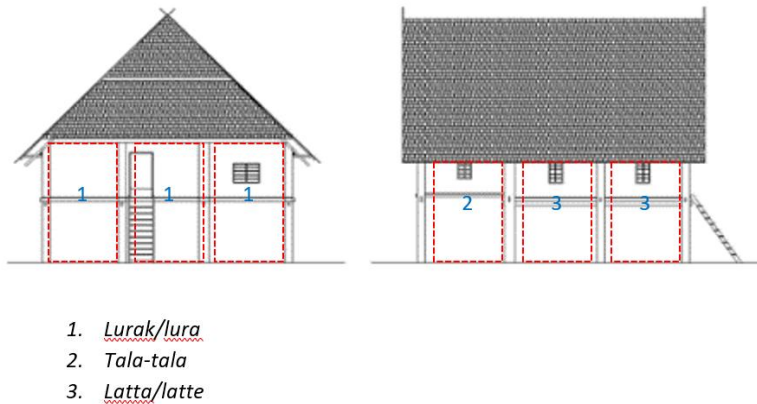


Figure 2. The house measuring three *lura* and two *latte* plus *tala-tala* (sketch: Andi Abidah, 2020).

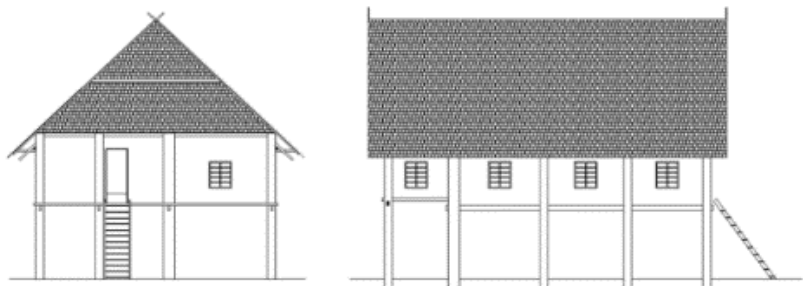


Figure 3. Three *lura* by three *latte* plus *tala-tala* (sketch: Andi Abidah, 2020).

Generally, all houses are designed to ensure air circulation which occurs not only through the standard openings of the house such as doors, windows and vents but also through the floor which is constructed with gaps between the slats. Rudimentary oil lamps are used in homes only after dark as the community follows their customary regulations which require them to maintain a simple life (see figure 4).



*Figure 4. Traditional lamp (pelita: local language). Mustamin's house (photograph: Andi Abidah 2020).*

## **5. Discussion**

Indonesia's geographical position is on the equator, which means that all islands in the archipelago experience high rainfall and humidity, low wind speed and intense sun, all characteristics of a tropical climate. Each customary dwelling consequently requires a design that incorporates a good amount of ventilation in order to meet the occupants' physiological needs.

The ancestral land of the Ammatoa Kajang is about a six-hour overland trip of almost 200 kilometers from the Sultan Hasanuddin International Airport in Makassar, South Sulawesi. As all the conveniences of modernization inexorably make their way into the hinterlands of Indonesia's archipelago, it is becoming increasingly rare to find indigenous communities that have chosen to maintain the way of life of their ancestors in toto. This has been achieved, however, by effectively allowing members of the Ammatoa Kajang indigenous peoples to split into two geographically and, in some aspects,

culturally distinct communities, which the Ammatoa Kajang refer to in their language as *ilalang embayya* (inside the fenced area), also known as *rambang seppang* or the Kajang Dalam area, and the *ipantarang embayya* (outside the fenced area), also known as *rambang luara* or the Kajang Luar area by S.Aminah [10].

Those who live in the Kajang Luar area effectively act as a buffer between those living in the Kajang Dalam area and the rest of the world, as they are able to embrace modernity and yet maintain ties to their cultural heritage because they have chosen to only loosely follow a few of the Pasang ri Kajang customs. This can be seen in the Kajang Luar community's use of modern tools and equipment to cultivate their land, in the wearing of modern clothing, and in the interior of their houses, which are often in appearance not very different from homes in suburban areas of Indonesia. The modern houses of various shapes and sizes of the Kajang Luar, are oriented facing the road, use electricity, have modern plumbing and generally incorporate into their construction, cement on wood frames, ceramic tiled floors, zinc roofing and glass window panes with metal bars in the window openings as explained by A. Abidah, M. Yahya, and B. A. Rauf [11].

On the other hand, the Kajang Dalam community's houses are built entirely out of natural materials This is in strict obedience to every precept of the Pasang ri Kajang, which influences all aspects of daily life including the construction and placement of every thatch-roofed, wood and bamboo home within the environment.

### **5.1. Cultural influences on indigenous dwellings**

The Ammatoa Kajang community has continued to live in a symbiotic relationship with their environment. They are prohibited from cutting wood in their sacred forest. Certain areas are allocated for the planting of trees to be used for firewood and construction, while fruit-bearing and other productive trees are planted closer to the dwellings. When any of these trees are cut down, a tree must be planted as a replacement. Moreover, every house has its own kitchen garden that supplies ingredients for the family's daily meals and is cultivated close to the house by the women. As a result, the Kajang Dalam area remains lush and green. Nature is an ancestral heritage that needs both its quality and balance to be maintained. The resolution of the Kajang Dalam community to preserve their forest and natural surroundings is evident in their firmness in applying their ancestral teachings, called *Pasang ri Kajang*, I. H. Darmawan [12]. This approach promotes the necessary balance, enabling this community to live in comfort and harmony with the natural environment, as explained by M. Aarifin, W. Wahidah Osman and S. Wunas [13].

The houses built within the Kajang Dalam area are in strict adherence to

all the customary rules including those which deal with all aspects of the form and elements of their stilt homes, such as the size and orientation of each house, the material that may be used for construction, the shape and position of the windows, the location of the kitchen, and the staircase. Even the placement of a house in the Kajang Dalam area and its construction are considered a ritualistic rite as Sukman notes [14]. All Kajang Dalam houses, as Nurhayati [15] observes, have small dimensions, are simple in form without any ornamentation, and are constructed using similar materials in a standard floor plan that does not reveal any signs of social hierarchy. Houses are oriented facing the sunset with their back against the venerated customary forest and their windows open to the sun, on their north and south walls. All this affects the physiological comfort of the home's inhabitants.

Traditional houses in Indonesia can be seen to have their design, and especially orientation, influenced by Hindu and Islam, as explained by P.J.M. Nas [16]. Hindu practices forbid houses from being built facing the sunset, as the sun is analogous to life. When Islam started spreading its influence – in Aceh – the Hindu-oriented houses changed to face Mecca in a West-Northwest direction. Further evidence of such influences, according to A. Abidah [17], can also be found in the old settlement of the Soppeng-bugis tribe where formerly North-South oriented houses are now oriented toward Mecca. However, after Indonesia's independence and from the 1970's on, new settlements in the Regency of Soppeng no longer followed this rule of orientation according to culture, tradition and beliefs, they followed local government regulations (each Regency has a mayor or regent). This meant that houses had to be oriented toward the road, except in the case of tribes who did not accept modernization, such as the Kajang Dalam.

As the use of modern material is forbidden, the Kajang Dalam houses are constructed of wood and bamboo. They are topped with box gable roofs that have a 45-degree pitch and covered with a thatch roof made from cogon grass (*Imperata Cylindrica* Sp.); strands of this grass are assembled and tied to bamboo sticks to form sheets of a specific size, making the houses much cooler than those in the Kajang Luar area, where zinc is used as a roofing material.

Generally, the walls and floors are constructed with a combination of wood and bamboo, while some houses do not use any bamboo at all. The staircase to the front door, which is centred at the front of the house, is open to the elements, so the wood used for constructing the stairs is of noticeably better quality to withstand weathering. At the top of the stairs everyone who enters must step over a plank that has been fitted lengthwise across the threshold called a *kappa-kappang*.

The ten objects of this study were similar in size and shape, as anthropometry is used to set the dimensions of each house, and the terms *lura* for width and *latte* for length are used as measurements. The dimensions of one *lura/latte* are taken using the body of the owner. A *depa* is another

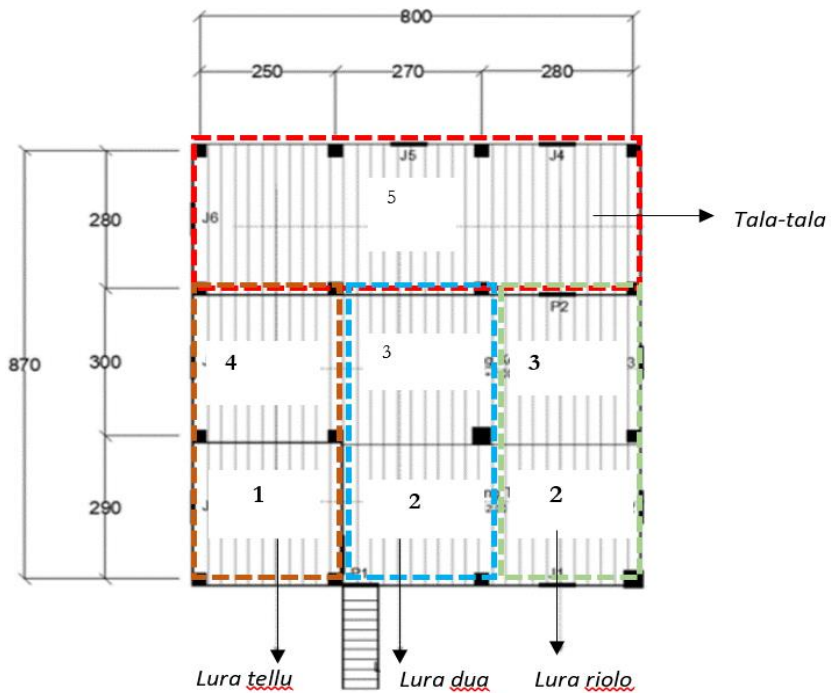


measure of length and is the equivalent of the span of one man's body with outstretched arms measured from fingertip to fingertip. A *hasta*, on the other hand, is measured from the elbow to the tip of the middle finger. Anthropometry is commonly used by many indigenous peoples as a way to measure different things. It can include, as P. Oliver [9] explains, the length from the fingertip of the little finger and its base, the span of a hand, the length of an arm, as well as other parts of the body including the torso, each representing a different unit of measurement.

Anthropometry also occurs in many other cultures in Asia. The measurements of Malay houses, as Z. Zain [18] states, are based on the human body to determine the height of doors, windows, fences and so on. Furthermore, Balinese house dimensions, as I. M. Bidja [19] states, use the human body to calculate the size and scale of buildings to ensure that a balance between the environment and humans is maintained. In the Bugis house, a special method of using the torso of the human body to dictate the width and length of a home, is also used, Andi Abidah [17]. All the study objects also had a *tala-tala*, which is a narrow extension along the back of the house with a slightly higher floor height. Eight of the ten houses measured three *lura* by two *latte* and had a *tala-tala*, while two houses were wider by a third, at three *lura* by three *latte* with a *tala-tala* along the rear, as shown in figures 5,6,7 and 8.



Figure 5. *Lura/lurak*' of house (source: Andi Abidah 2020).



1. Washing area and kitchen
2. Guest room and men's space
3. Family room and women's space
4. Space for preparing food and dining
5. Sleeping room for girls or female guests

Figure 6. Floor plan of the lura and tala-tala (source: Andi Abidah 2020)



Figure 7. Latte or latta' of the house (source: Andi Abidah 2020).

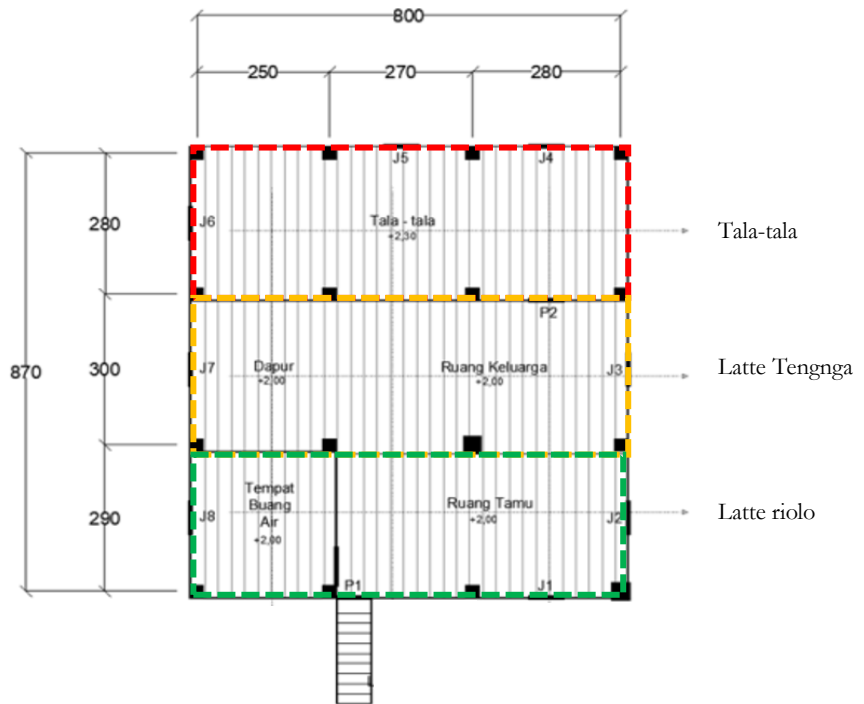


Figure 8. Latte and tala-tala in room plan (sketch: Andi Abidah 2020).

The placement of the kitchen is unusual and yet it has remained in this position, unchanged, for generations in every Kajang Dalam house. It is located at the front of the house to the left of the entrance in the third *lura / lurak* of the first *latte* so that it is always visible to guests in the sitting room to the right of the front door, as seen in the floor plans of figures 6 and 8. This indicates the openness of the occupants about their food, as nothing is hidden. The kitchen is like a cube in its dimensions. Cooking is done on a low wooden table on which large stones, or sometimes simple furnaces, are placed to burn firewood. Over the cooking area, close to the ceiling, is a shelf which is used to store firewood. Next to the cooking area, which also occupies the first *lura* and third *latte*, is a simple washing area where a relatively large water container is placed to supply water for cooking and cleaning. This area is also used by the occupants as a place to wash before going to sleep, as well as a convenient place to urinate at night. By comparison, the kitchen in a Bugis house, as C. Pelras [20] explains, is located in the *lontang*, or in the last part of the house (*lontang* in the Bugis language or *lura / lurak* in the Makassar Konjo language / the language of the Kajang). It is rare to have the kitchen situated within the main part of the house in Indonesia, as J. Forshee [21] verifies. This is because Indonesians in remote areas still cook using traditional methods which produce smoke.

Storage is constructed as a shelf along the interior of the north and south walls of the house that extends under the eaves like a soffit and is referred to by the Ammatoa Kajang as a *para-para*. In the kitchen, this is used for the storage of cooking equipment, buckets and plates, while the *para-para* on the opposite side is used to store floor mats, bedding and clothing. A similar storage shelf can be found in Bugis houses built before the 1970's, according to Andi Abidah [17], and are referred to as *tanre-tanreang* in Bugis. However, this element is slowly disappearing.

## 5.2. Indigenous techniques to maximize ventilation and light

The customary rules concerning windows allow for these to be placed along both sides of the house with each *latte* having two windows – one on the left side and the other on the right of the door (see figure 9).



Figure 9. Cross ventilation (sketch: Andi Abidah 2020).

The number three is significant in Ammatoa Kajang culture, so every house is constructed with three windows along its north and south sides respectively. Each window of the study objects differed slightly in size, but their rectangular shape, style and material were uniform. All windows are fitted with wooden bars, as glass is forbidden to be used. They must be kept open during the day and closed only at night with a sliding wooden panel set between upper and lower wood guide rails fitted onto the interior wall of the house. This style of window closure, depicted in (figures 10 and 11), is unique to Ammatoa Kajang dwellings.

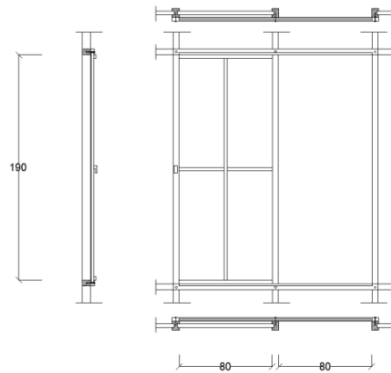


Figure 10. Sliding window model (sketch: Andi Abidah 2020).

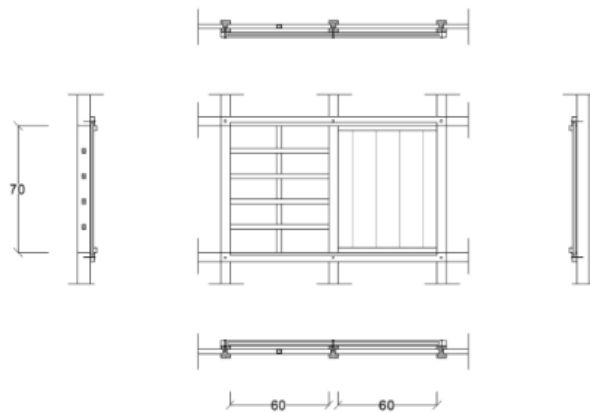


Figure 11. Sliding window model (sketch: Andi Abidah 2020).

Generally, the floor is made of wood and bamboo. Bamboo slats are used in the first and second *latte* while the *tala-tala* has a wooden floor. The flooring throughout each house has gaps of approximately one centimetre between each wooden plank and bamboo slat, to allow air circulation also at night, when the windows and door have been closed. The gaps also allow for liquid waste to pass through in the washing area beside the kitchen. This use of materials, according to S. Chuki, R. Sarkar, and R. Kurar [22], can be seen in traditional Thai houses that use bamboo, wood planks, and thatch, the difference being that bamboo is used not only in the corridor of the house but also in the construction of the roof to support the thatch.

The other factors that maintain physiological comfort are the attention to the layout of the house's mass, and the density or distance between the dwellings and any other barriers, such as vegetation, that would decrease air quality and flow. The distance between houses is between three to five meters with well-maintained foliage surrounding each house, said T. E. Swasti [23]. Furthermore, Dipl. Ing. Y.B. Mangunwijaya [24] observes that such cross ventilation promotes the flow of outdoor air into the house as a result of the difference in pressure or temperature between the interior space and the exterior environment.

### 5.3. Indigenous management of clean and black water

One of the factors that affect physiological comfort is the presence of odours. Washing and bathing are daily activities that require a lot of water and therefore the Ammatoa Kajang have found ways to ensure that water does not stagnate and smell.

Clean water does not flow to the residents' homes. Instead, householders carry fresh water by bucket to their respective houses. The Ammatoa Dalam area has only one source of clean water, positioned at 5°19'27.7" S 120°17'56.5"E, that serves three villages (see figure 12).



*Figure 12. Source of fresh water (source: Internet 2020).*

The spring water is channelled through bamboo to a location specified by the Ammatoa which is a public space where interaction between residents takes place every morning and evening. Here communities gather to bathe, wash clothing and equipment, and take clean water for drinking and cooking. In the first *latte* behind the kitchen, there is a small space for black water to drain where it falls directly to the ground on the left side of the house, then flows into a low area and seeps into the ground.

For the construction of their toilets, the Kajang Dalam community uses local wisdom and traditional methods because the use of modern materials for building are forbidden. Similar to an outhouse, their outdoor toilet, locally referred to as a *cemplung*, is placed next to each dwelling. The walls surrounding the 1.5 x 1.5 meter area are woven from sago palm fronds, and there is no roof. The toilet itself consists of a hole approximately one meter in diameter, dug 2 to 3 meters deep into the ground and covered with two sizeable flat rocks placed with a gap between them for the disposal of solid waste. There have been several Life Cycle Analysis studies conducted in recent decades concerning this particular way of dealing with black water, as F. Boano *et al* [25] explain, which actually receives good marks in terms of environmental and energy advantages when such processing systems are integrated into green structures.

## 6. Conclusion

Even though the Ammatoa Kajang indigenous community in the Kajang Dalam area strictly adhere to centuries old customary rules, it is the holistic perspective of the Pasang ri Kajang together with the directives of their customary institutions that regulate the community's interactions with the environment and each other for their physical, mental, and spiritual well-being. The Kajang Dalam residents have maintained and sustained the natural environment, which provides them with many necessary elements for their daily living. Their houses, where they admit to living comfortably, are constructed with materials that are readily available from their surroundings. They have a symbiotic relationship with nature, as what they take from the environment is given back, for example, by planting one or two trees when one has been cut down; this is also because the Kajang Dalam peoples believe that nature will be angry if they violate any of their customary rules.

## Acknowledgments

Thanks go to Universitas Negeri Makassar which gave us the opportunity to carry out research in Kajang; funded by DIPA PNBP of the Postgraduate program at Universitas Negeri Makassar. Thanks also go to the communities of Kajang, especially Kajang Dalam.

## Notes

<sup>1</sup> Ammatoa is the local language of the head of customs or leader of the customs of Kajang Dalam; Kajang Dalam area is the area that still preserves its tradition, culture, religion, and has not undergone any modernisation, whereas Kajang Luar is already accepting modernization. The communities of Kajang Luar area step by step avoid tradition, culture,

and religion. They are already accepting modernization and do not follow the rule of Ammatoa in Kajang Dalam.

<sup>2</sup> The results of the Ammatoa Indigenous Participatory Map processing Kajang\_UKP3 AMAN Sulsel. AMAN (Aliansi Masyarakat Adat Nusantara / Alliance of Indigenous Peoples of the Archipelago).

## References

- [1] Rudi Gunawan, *Rencana Rumah Sehat*. Kanisus.
- [2] R. Waterson, 'The Living House An Antrhropology of Architecture in South-EastAsia', Oxford University Press Pte Ltd, 1990.
- [3] C. Pelras, 'Religion, Tradition and Dynamics of Islamization in South Sulawesi', vol. 29, pp. 107–135, 1985.
- [4] A. Rapoport, 'Culture , Architecture , and Design'.
- [5] Erawati Lewa, 'Arsitektur Rumah Tradisional Suku Kajang di Provinsi Sulawesi Selatan', *Mozaik Hum.*, vol. 18, no. 80–92, pp. 1689–1699, 2018.
- [6] Palembang Nadji (2006) *Arsitektur Rumah Tradisional Bugis*. Makassar: Badan Penerbit Universitas Negeri Makassar.
- [7] W. Osman, 'Karakteristik dan Aturan Adat pada Tataan Rumah Tinggal dan Permukiman. Studi Kasus: Permukiman Ammatoa Kajang.', Tesis Jurusan Teknik Arsitektur ITS. Surabaya, 2000.
- [8] Gallahue, D.L., Ozmun, J.C. (1998) *Understanding Motor Development Infant Children, Adolescent, Adults*. USA: Mac Graw Hill Company.
- [9] P. Oliver, Ed., 'Theories and Principles' (1997) in *Encyclopedia of Vernacular Architecture of the World*, The Pitt Building, Trumpington Street, Cambridge, United Kingdom: Cambridge University Press, 1997, pp. 6–15.
- [10] S. Aminah, *Nilai-Nilai Budaya Spritual Masyarakat Ammatoa Kajang*. Depatemen P & K Sulawesi Selatan, 1989.
- [11] A. Abidah, M. Yahya, and B. A. Rauf, 'Kajang Traditional House Outside And The Physiological Comfort Of Its Occupants', pp. 446–448.
- [12] I. H. Darmawan, 'Upaya Pelestarian Sumber Daya Alam Dalam Kehidupan Masyarakat Adat Desa Tana Toa Kecamatan Kajang Kabupaten Bulukumba', Universitas Islam Negeri Alauddin Makassar, 2019.
- [13] Mimi. Aarifin. Wiwik Wahidah Osman, Shirly Wunas, 'Struktur Kawasan Permukiman Ammatoa Kajang Ditinjau Dari Nilai Kearifan Lokal Pasang Ri Kajang', *lpbi*, no. 1, pp. 127–130, 2016.
- [14] Sukman, 'Arsitektur Vernakular Ammatoa Kajang di Sulawesi Selatan', Universitas Gaja Mada, 1993.
- [15] Nurhayati, 'Karakteristik Rumah tinggal Tradisional kawasan



- Ammatoa Kajang', UNHAS, 2000.
- [16] P. J.M.Nas, 'The house in Indonesia Between globalization and localization', *Bijdr. tot Taal-, Land- en Volkenkd.*, vol. 2, pp. 335–360, 1998.
- [17] A. Abidah, 'Nobel and Commoner Bugis houses in the regency of Soppeng South Sulawesi, Indonesia', Vienna University of Technology, 2019.
- [18] Z. Zain, 'The Anatomy of Traditional Dwellings :Comparative Study between Malay and Dayak Indigenous Architecture in West Kalimantan', Technische Universität Wien, 2012.
- [19] I. M. Bidja, *Asta Kosala-Kosali Asta Bumi*. PB, 2000.
- [20] C. Pelras, 'Bugis and Makassar Houses Variation and evolution', in *Indonesian houses*, R. Schefold, G. Domenig, and P. J.M.Nas, Eds. Singapore: SUP Singapore University Press, 2004, pp. 251–281.
- [21] J. Forshee, *Culture and Customs of Indonesia.*, Culture an. London: British Library Cataloguing, 2006.
- [22] S. Chuki, R. Sarkar, and R. Kurar, 'A Review on Traditional Architecture Houses in Buddhist Culture', *Am. J. Civ. Eng. Archit.*, vol. 5, no. 3, pp. 113–123, 2017.
- [23] T. E. Swasti, 'Pengaruh Kerapatan Bangunan pada Karakteristik Termal Rumah Tinggal Kampung Naga terhadap Kenyamanan Penghuni', *J. Arsitektur, Bangunan, Lingkungan.*, vol. 5, no. 2, pp. 83–90, 2016.
- [24] Dipl. Ing. Y.B Mangun Wijaya, *Pengantar Fisika Bangunan*. Penerbit Djambatan, 1988.
- [25] F. Boano *et al.*, 'A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits', *Sci. Total Environ.*, vol. 711, p. 134731, 2020.

## Biographical notes

**Andi Abidah** finished her doctoral studies at the Institute of Building History and Building Archaeology at TU Wien, Austria. She studied Urban Design in her Magister's degree from the Institute of Technology at Bandung, Indonesia. She obtained her bachelor's degree in architecture at the University of Hasanuddin, Indonesia. She is currently head of the architecture study program at the Universitas Negeri Makassar, Indonesia. Her interests include research on the history and culture of architecture and urban heritage, particularly in ancient historical cities.

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### **Summary**

Even today, there are communities of indigenous peoples in Indonesia that have chosen to live as their ancestors have. Their lives are strictly governed by customary rules that have been handed down for hundreds of years and set out in detail every aspect of how their dwellings are constructed; they take into consideration where and how their houses are built, and the effects of their dwellings on the physiology of the occupants, as well as the social, spiritual and cultural relations within their community, well-integrated into their system of beliefs and their environment. One of these indigenous communities that lives this way of life and has shunned all forms of modernization, is the Ammatoa Kajang, who inhabit a remote area of the South Sulawesi province. Their traditional homes, even today, are built adhering to centuries old oral precepts that incorporate many of the scientific principles that have been proven only in the last one hundred years to link house construction to its occupants' physical and mental health. This is a qualitative study using both anthropological and architectural approaches to examine the homes of the Ammatoa Kajang indigenous community.



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**paper submission Conservation Science in Cultural Heritage**

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30 January 2022 at 15:01

To: "ANDI ABIDAH, ST, MT UNM" <andi.abidah@unm.ac.id>

Dear Dr. Andi Abidah,

Thank you for the update and paper.  
Everything looks fine, so this version is the final draft.  
You will hear from us in the following months.  
Thank you for your time and collaboration.

Kind regards  
Angela Mari Braid

[Quoted text hidden]