

## **Green Materials in Traditional Housing: A Local Wisdom Lesson**

Nurul Fakriah, M. Arch

*Ar-Raniry Islamic State University, Jalan Syekh Abdur Rauf Kopelma  
Darussalam, Banda Aceh 23111, Indonesia*

**Abstract:** The consideration of sustainability, sustainable development, or sustainable future began to emerge in the beginning of 18th century, precisely after the Brundtland Commission Report had been published in 1987. In the beginning, environmental awareness rose in the industrial country such as European countries and America. It is the consequence of the industrial revolution which had caused negative impact to the environment. Furthermore, climate change and global warming have become a great issue. Buildings gave contribution in this issue due to their consuming energy and releasing emissions. Therefore, the use of appropriate material is a key point of green building. Some considerations of material selection for green building are resource efficiency, indoor air quality, energy efficiency, water conservation, and affordability. These aspects are analysed in traditional house's materials. The result from this qualitative approach shows that the materials used in traditional houses are green. There are some lessons that can be drawn from this local wisdom. They could be very useful for the future design of buildings.

### **A. Introduction**

After the Brundtland Commission Report had been published in 1987, the world was awakened and enlightened about the condition of environment. The awareness of sustainability of our world was spread out. The problem caused by human activity in Industrial Revolution has endangered the sustainability of the world. However, Industrial Revolution increased the quality of life of human being. The consideration on how to balance this quality of life without harming the environment becomes an issue of sustainable development. Building causes half of emission and energy consuming. Therefore, the use of appropriate material is important in creating sustainable building or green building.

### ***Green building/sustainable building***

Definition of green building or sustainable building related to definition of sustainable development in Brundtland Commission

Report which was “development that can fulfill the needs of present without compromising needs of future” [1] is the building that fulfills the needs of present without compromising the needs of future. Another definition from Scott (1999) about the concept of ecological design in the sector of construction is “the creation and responsible management of a healthy built environment, based on the efficient use of resources and on ecological principles”[2]. In order to create green building or sustainable building, a green material is needed. Based on above definition, the keywords that should be noticed are ‘future needs’, ‘healthy built environment’, and efficient use, and ecological principles”.

Prior to Industrial Revolution, society had met most of its needs of materials obtained directly from the Earth and then returned those materials to the earth after their use [3]. According to the definition of green materials, the question addressed to this: “are they green?”. One example of building that was established before Industrial Revolution and can be traced until now is a traditional house.

## **B. The Traditional House**

The Traditional house is typically located in middle of traditional society. Traditional society means the society who still keep the values of its tradition. For the society, houses and their settlement are not only about building to live in, but also their way of life. Including in their way of life are the selection of materials, the used construction, the space programming and the way they use the space refers to the tradition which is passed from generation to generation.

Because of this consideration, the use of materials in a traditional house cannot be separated from the other aspects which influence the establishment of a traditional house. The whole aspects form the traditional houses and are linked to each other.

## **C. Materials in Traditional House**

A traditional house typically uses materials from nature, such as wood, timber, bamboo, sago palm, etc. Every different material that used in traditional house has a different way of use.

For example for a traditional house that uses timber or wood for material, there are some considerations of selection criteria which varies from one culture to other. There are some location of woods that are not allowed to enter nor to take timber from there. In this way, the use of materials will not lead to nature exploitation, because there are values of tradition to keep the nature and the environment. Commonly, a material is gotten from neighbourhood. Another example of values of tradition is the limitation in getting the material, whether the limitation is by the location, by the time, or by number.

This study case took example from Acehnese traditional house, which is called “Rumoh Aceh” located in Aceh Besar. In this traditional house, the common used material is timber/wood. However, there are also some possibilities to use other materials that are existed in the neighbourhood, i.e.: bamboo and sago palm.

### 1. Wood/Timber

The use of wood or timber is very common in a traditional house. The same thing applies to Rumoh Aceh. The community of traditional societies that used this material, in most cases, live near to the woods. Woods are normally used as column or pillar in Rumoh Aceh, while timbers are used as flooring material.



Fig.1. (a) Rumoh Aceh use timber/wood material;  
(b) Rumoh Aceh use sago palm and bamboo materials

## 2. Bamboo

One of material that used in the Acehese traditional house is bamboo. Bamboo is perenial grass with woody stems. It is a rapidly renewable material as it tends to use less land and have a faster economic cycle than materials that grow in longer spans. A material can be considered rapidly renewable if the growing span is less than 10 years from seed to harvest maturity.[4]

In Acehese traditional house, bamboo is used as floor material. It is placed to each other with a space in between. This arrangement allows air circulation through floor, since in Acehese traditional house, the floor is not grounded. See fig. 2.(b).

## 3. Sago Palm

Another alternative material that is used in the Acehese traditional house is sago palm, which is also known in local as *rumbia*. For material use, sago palm produces midribs and leaves. Midribs are used as walls while leaves are used as roof. See fig.2.(a).

## D. Green materials indicator

### 1. Resource efficiency

Since the woods or timbers used in a traditional house and Rumoh Aceh are normally taken from the neighbourhood, it is efficient to use materials that are located nearby to the settlement. There are some local and traditional regulations in getting the materials, as well.

Bamboo production is four times more than wood [5]. Whenever bamboo is used, a valuable contribution to the environment is made as slower growing hardwood forests are left untouched. Bamboo can be harvested every 3 to 6 years if it is handled properly, and will regrow from the same rhizome without being replanted. This can be done in an infinite number of times without harming the rhizome's ability to produce a new shoot and has minimal impact on the soil and nutrients, as bamboo can grow in relatively poor soil as long as rainfall is adequate.[4]

Meanwhile, sago palm is used as material of houses only when it is nearby. Its lifespan is more than 30 years. Consequently, it is efficient in term of natural resource.

### 2. Indoor air quality

One consideration that might come into mind when observing

the form of some traditional house is about the air quality of the room, especially when the form shows massif facade, which looks solid from outside. In fact, with the appropriate material selection, the indoor air quality in a traditional house will stay fresh. Since material used in a traditional house is natural, then it is non-toxic and do not harm the air quality. The way of using the material also shows that the quality of the room, in this case means air circulation, is flowing by the space between materials. See fig.2.(b)



Fig.2.(a) Midrib of Sago Palm as wall's material;  
(b) Space between material

### 3. Energy Efficiency

Since the traditional house related to traditional society and their way of life, the use of energy also become a consideration in way of life of traditional society. Community in traditional society lives more outside during daytime and using small amount of energy during night. There is no need of air condition because the thermal comfort in this house is fulfilled.

### 4. Water Conservation

Bamboo grows very rapidly with small amount of water which is generally supplied adequately through natural rainfall. Similar to bamboo, sago palm and tree that produced wood grow with water which is supplied through natural rainfall.

### 5. Affordability

Since the material is taken from nearby locations and provided freely by the nature, it means that the material for traditional house is affordable.

## E. Conclusion

Traditional houses, especially in Rumoh Aceh use green materials. It does not apply only to the material that coming from nature, but also include the result of the construction. It is due to limitation of the society to the technology the reason that they use materials from nature and the connection to their way of life, as well. The consideration in selecting materials is very close to their concept of life. This concept contains the way of thinking, the way of life, the way of awareness, which is called local wisdom. In the urban area, where people live with rapidly advanced technology, this wisdom should be also transfered to society in order to take advantage from it. It does not mean to imitate the way of living of traditional society, but to change our way of life to be more friendly to the environment.

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