

Blending Architecture with Nature: Concepts of Sundanese Architecture and their Applications in Contemporary Architecture in Kampung Naga, Indonesia

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Abstract

Sundanese are the largest ethnic group in the province of West Java, which is one of the provinces that has experienced a recent evolution of architecture. Many people apply the concept of Sundanese architecture into their residential architecture and even into public buildings. Many houses constructed using ideas of Sundanese architecture are very interesting to study. In general, the design concept of Sundanese architecture is to blend with Nature.

One of the notable applications of such ideas is in the Kampung Naga area, which is located in the Nelgasari Village, Salawi District, Tasikmalaya Regency, West Java Province. Kampung Naga is a village that is still inhabited by people who have a strong belief in the ancestral customs.

The aims of this research are to understand the concept of Sundanese architecture for houses in Kampung Naga, and to ascertain their application in sustainable architecture designs.

The research employs a qualitative research method, where the researcher is the key instrument. Primary data were obtained from field measurements, observations and interviews.

The findings show how the concept of Sundanese architecture and sustainable architecture are applied in Kampung Naga. They provide insights into the possibility of the application of architectural concepts in the future.

Keywords: Sundanese Architecture, Sustainable architecture design, Kampung Naga, Tasikmalaya

Introduction

Indonesia has buildings with various architectural styles. It has houses with different architectural styles, belonging to Nusantara architecture. The Sundanese are an ethnic group originating from the western part of the Java Island, Indonesia, known as the Tatar Pasundan which covers the administrative areas of the Provinces of West Java, Banten, Jakarta, and the western region of Central Java (Banyumasan). The Sundanese are scattered in various parts of Indonesia,

with the provinces of Banten and West Java as the main areas. The house of the Sundanese people besides having a function as a place to live is also a place for family activities in various aspects of life driven by traditional values.

The role of the house according to the Sundanese community is as a place for *jeung rabi* (family and descendants), as well as a place for the radiance of taste, intention and work. Sundanese houses are often referred to as stilt houses, because part of the house is made above the ground as if it were floating on a pedestal. The pedestal is made of river rock and then supported by pedestal foundations which are commonly called *tatapakan* (foundations), *wadasan*, *umpak*, and *titinggi*. The pedestal is made at a height of 40 cm to 60 cm. The ground space or the space between the ground and the floor of the house is referred to as *imah* (house). The purpose of making a space under a *imah* is to store livestock and feed, firewood and so on. Architecture of Sundanese houses include various types of buildings, based on the shapes of the roofs, and the placement of the entrances (Ilham & Sofyan, 2012).

One of the villages that has a Sundanese architectural dwelling is Kampung Naga which is located in Nelgasari Village, Salawu District, Tasikmalaya Regency, West Java Province. Its villages are still inhabited by people who have strong beliefs and customs. The houses in Kampung Naga are made according to pre-determined regulations. The material used is still friendly and natural. Given this, this discussion is aimed at understanding how the concept of sustainable architecture is implemented in the Kampung Naga settlement. The research examines the ways in which these ideas manifest in the houses in this village.

Its objectives are:

- 1) To explore the concept of Sundanese architecture in the Kampung Naga area.
- 2) To understand the application of the concept of sustainable architecture that preserves Nature in Kampung Naga.

By understanding the concept of Sundanese architecture in Kampung Naga, a reference for how people should design houses related to Nature and therefore sustainable can be identified.

Review of Literature

According to the Oxford Advanced Learner's Dictionary (2015), sustain means: 1) to provide enough of what somebody/something needs in order to live or exist; 2) to make something continue for some time without becoming less. Sustainable (adjective) means: 1) involving the use of natural products and energy in a way that does not harm the environment; 2) that can continue or be continued for a long time; and sustainability is the noun form of sustainable. According to Toland and Guidera (2017), sustainability happens when new ways of working and improved outcomes become the norm and the improvement has become an integrated and the mainstream way of working. Caradonna (2014) reveals a model that reconceptualizes a diagram as a series of concentric circles, in which the environment is seen as the foundation of sustainability, with society and economy nested inside.

Muller (2002) points out that in June 1996, the second UN Conference on Human Settlements (Habitat II) in Istanbul put forward ways of applying sustainable principles in building architecture. Since then, public opinions have begun increasingly to focus on environmental protection and the need for a healthy and safe environment. Sustainable architecture is only really effective when set in an urban planning context which itself is based on sustainable principles. Frick & Mulyani (2006) state that development with the principle of ecological architecture is a building concept that considers the harmony between people, buildings and the environment. Zhang et al. (2018) states that the role of the people who inhabit permanently in buildings was crucial for energy use. In addition, Yuliani & Setyaningsih (2018) also conclude that one of the determinants of sustainable development was community participation in active roles accommodated in design. According to Uddin et al. (2021), the building occupants and their behaviour are crucial components in our built environment, and their tremendous impact on building energy consumption has recently begun to increase in appreciation. Tricarico (2017) states the role of the community in each dwelling is of concern to be investigated because it has a greater potential for sustainability compared to people who live together in buildings.

Studies indicate that people's perceptions of interpreting space can be different from the purpose of the space provided by the government through the design of a planner. According to Tricarico, the main way to accommodate the role of the community in sustainable development includes four things. They include knowing the limits of community values, promoting equal democracy in society, neutral communication, and understanding the level of community knowledge. Yuliani, Hardiman & Setyowati (2020) examine the discipline of architecture by considering the role of the community in managing architectural substitution of green-space.

Trebilcock and Reyes (2011) stress out that there is no single image of sustainable architecture, but a rich scope of images that put emphasis on different factors that lead towards sustainability. This diversity of images reflects an interesting dialogue between architecture and the environment that is far from issues such as global warming and the ozone layer, but closer to the elements of climate, landscape and local architecture.

About local materials and sustainable architecture, Minke (2022) states that the majority of traditional houses in the rural zones of warm humid climates where bamboo grows, are constructed of bamboo. Indeed, it is a construction material with many applications. Bamboo is a rapid-growing natural resource that can produce much dry biomass per hectare per year than eucalyptus. Ilham & Sofyan (2012) argue that Kampung Naga is a traditional village that are still preserved by maintaining their traditions to maintain their natural environment. This has been going on for a long time because they are maintained by the whole community. According Wahyudi (2010) the traditional buildings of Kampung Naga are one of the traditional buildings that is sustainable until now. It has a very high efficiency of environmental friendliness.

The Research Method

This research employs a rationalistic approach within a qualitative paradigm. Research data was gathered through library studies as descriptive material. It also involved field observations in Kampung Naga. It unraveled discussions on the concept of sustainable architecture in Kampung Naga, Tasikmalaya using descriptive methods based on empirical facts. These are communicated using review of existing literature as material descriptions juxta positioned with field observations in Kampung Naga. The data obtained are summarized, classified, and structured for the purpose of analysis.

The Findings and the Discussion

1. Geographical Conditions and the Administrative Areas

Kampung Naga is a village inhabited by a strong community that upholds the traditions and customs of their ancestors. Administratively, Kampung Naga is located in the Neglasari Village area, Salawu District, Tasikmalaya Regency, West Java Province. The area is bounded by: a) The sacred forest to the West (which is where the ancestral graves of the Kampung Naga community are located); b) The rice fields of the people of Kampung Naga to the South; c) The Ciwulan River, whose water source comes from the Mount Cikuray in the Garut area, to the North and East.

The distance from Tasikmalaya City to Naga Village is about 30 Km, while the distance of Kampung Naga from the city of Garut is \pm 26 Km. Access to this village is not too difficult. To reach Kampung Naga from Garut-Tasikmalaya highway, one has to go down a rock stairway (Sundanese: *Sengked*) with a slope of about 45 degrees and a distance of about 500 meters to the bank of the Ciwulan river (Fig. 1), and then through a path, walk through the Ciwulan River to Kampung Naga. It is located in the valley of Salawu hills with a village area of 1.5 hectares and a customary area of 4 hectares and an altitude of about 600 meters above the sea level. The topography of the village area is hilly and quite steep. The soil density is relatively stable, and the condition of the soil is fertile.

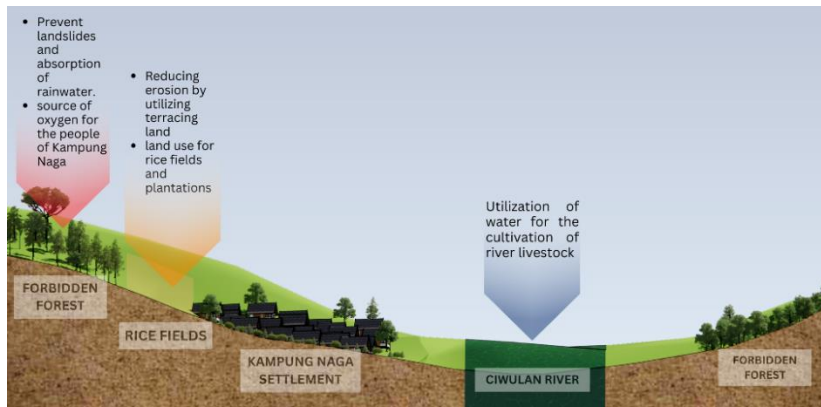


Fig. 1: Topography of the Kampung Naga
Source: Sudarwani, 2016

2. The Patterns of Settlements in Kampung Naga

The location of the settlements in Kampung Naga has a pattern that spreads according to the availability of land based on the customary rules. Most houses face each other and are required to face North and South. The landscape of Kampung Naga is hills with fertile soil (Fig. 2). It consists of three parts: the forest area, the residential area, and the outer area (dirty area). In this pattern, there are three elements which mutually support the fulfillment of the daily needs: 1) The house is as a place to live, and shelter from the wild animals. Sundanese houses use natural materials and are friendly to the environment; 2) A source of water is always available for the fulfillment of survival, whether raising fish, irrigating rice fields, cultivating crops, or for other needs; and 3) The pattern of the settlements, and the village spatial planning maintain the contour patterns and environmental balance.



Fig. 2. Siteplan of Kampung Naga
Source: Sudarwani et.al, 2022

3. Typology of Buildings in Kampung Naga

People of Kampung Naga Tasikmalaya are capable of maintaining their regional identity expressed through the Sundanese architectural style fashioning their dwellings. The buildings in Kampung Naga consist of:

- a. *Bumi Ageung* (big house), which has a smaller size than an average house, but has a major function and meaning. This building has a sacred character because it is used as a place for storing heirlooms and also as a place to live for the oldest people among the residents of Kampung Naga, who are considered to be the closest descendants of their ancestors. This sacred house is located on the second terrace from the bottom.
- b. The Mosque and *Bale Patemon*, which are located in an open space and are two buildings located in a ‘clean area’, around people’s homes. The mosque in Kampung Naga has not only a function as a place of worship, but also as a place to study religion (Fig. 3).



Fig 3: *Bale Patemon* and Kampung Naga Mosque
Source: Sudarwani et.al, 2022

- c. *Leuit*/Rice Barn, which is a building located around the houses that belong to the residents of Kampung Naga. *Leuit* has a function to store the harvested rice donated by the residents. Rice is usually used when there are activities like rituals or other activities; for example, the restoration of the mosque or the *bale patemon*, and so on. *Saung Lisung* is a place where the people of Kampung Naga pound rice. This building is made separated from the houses and it is on the edge or above the fish pond known as *balong* (Fig. 4).



Fig. 4: *Saung Lisung* in Kampung Naga
Source: Sudarwani et.al, 2022

- d. Every house in Kampung Naga requires that each family can only have one head of the family and the ownership of the house is passed down from generation to generation through the eldest daughter in the family. If there is a marriage and they want to have their own household, then there is an area to build a house outside the Kampung Naga *Dalam* (=inside), which is commonly called Kampung Naga *Luar* (outside). This village refuses electricity from the government, because all the residents' buildings use flammable wood and fiber materials and they are worried about fires. At night, people of Kampung Naga are not allowed to use electricity; hence they only use a traditional lighting device called *cempor* with kerosene as fuel. During the day, natural light enters through the window openings and also through the holes in the roof which are covered with transparent material.

4. Materials in Kampung Naga

Houses in Kampung Naga are made of natural materials that are environmentally friendly. Stones found in the river and vegetation that grows naturally are the main materials used for the construction of buildings in Kampung Naga. The use of these materials is adjusted to their character and position in Nature. For example, river stones are used as the basic material for housing for the pedestal, road surfaces, or retaining walls, while wood is usually used for the manufacture of support pillars, battens, *tiang adeg*, and the rafters, Wood boards and bamboo is also needed to make the walls and floors or *palupuh*. The approach of Sundanese architecture to the concept of an earthquake-resistant house can be seen from the pedestal foundation, the presence of the shady space under the house, the shape of the roof, and the natural materials used (Nuryanto, Mardiana & Widaningsih, 2014). The building structure consists of foundations, walls, floors, and roofs, which can be described as follows (Fig. 5):

- a. **The Foundation:** The foundation system is a pedestal foundation which is approximately 50 cm above the ground level (Damayanti & Ningrum, 2019). A pedestal foundation measures 40 cm x 40 cm. The use of pedestal foundations aims to make the house over the surface of the soil and free from termites. The air quality in the house is very good because the air that comes in and out is channeled well through the stilt house.
- b. **Walls:** Walls of the houses use materials in the form of *gedhek* (Sundanese: *bilik*), *albasia* wood or *jaro* (bamboo slats with a diameter of 5 cm which are erected upright and wrapped with bamboo rope). Usually, painting is done using white chalk to protect the walls from the termites. On the inner wall, 23 cm from the floor, there is wood measuring 20 cm to hold the weight to prevent the building from collapsing. This type of wall building material is classified as flammable. The wall material is made like *sasag* (wall made of woven bamboo) so that air and lighting can get in and out properly.
- c. **Floors and roofs:** Flooring material of the houses is *albasia/sengon* wood. The roof consists of two layers: the bottom layer in the form of palm leaves and the top layer in the form of fibers wrapped with bamboo rope. Some parts of the roof have glass that allow natural light into the house.



Fig. 5: The House of Kampung Naga
Source: Sudarwani et.al, 2022

5. The Concept of Sustainable Architecture in Kampung Naga

Kampung Naga has received architectural design certification for energy-efficient green buildings, awarded by the Green Building Council of Indonesia (GBCI). Characteristics that are present include the arrangement of the site, the direction of the house, door openings, organization of space and provision of building materials. Characteristics passed down from generation to generation from their previous ancestors had implemented sustainable aspects, which are still becoming today polemic in the urban society. Sustainable architecture is an approach that has

environmental, economic, and social aspects. These three aspects are supported by the principles of sustainable architecture. Ardiani (2015) suggests that there are nine principles in sustainable architecture, namely: urban ecology, energy strategy, water management, waste management, materials, environmental community, economic strategy, cultural preservation, and operational management. Based on the research studies, Kampung Naga is one of the villages that still holds the cultural heritage of the Sundanese, including the culture of respecting Nature. Architecture of Kampung Naga was born from an understanding of the context of the local natural and social environment. For the residents of Kampung Naga, the forest is an asset because it stores an invaluable wealth of flora and fauna. It has four ecological characteristics that are still being maintained (Soeriatmadja, 2001). They are:

- a. The area which is located upstream in the form of a ridge, which is a relatively intact natural forest area, so that the function of water resources still plays a fairly good role. Meanwhile, the ridge of the hill which is located side by side with community settlements is planted with various types of trees.
- b. The forest, which functions as a buffer zone for the resilience of slopes and hills from the possible risk of landslides or floods in the rainy season and the risk of drought in the dry season.
- c. Kampung Naga residential area, in terms of the shape of the building which still reflects Sundanese architecture with philosophy values, the materials use, and the boundaries of the division of the residential area
- d. Diversity of biological natural resources that can be found in the rice fields, gardens, or in the yard of the house to fulfill their needs of nutrition and medicinal plants.



Fig. 6: The Culture of Respecting Nature in Kampung Naga
Source: Sudarwani et.al, 2022

Here are nine principles of sustainable architecture in Kampung Naga:

- a. **The principle of urban ecology:** The situation and condition of the Kampung Naga is as a settlement in the middle of a natural zone where the soil structure, biotic diversity, and ecosystem are still unspoiled. Until now, the village does not allow electricity supply from PLN (the State electricity company) and only uses kerosene lamps, the use of which is limited to 20.00 Western Indonesia Time. Extensive green open space and water paths with river biota and ponds are an endless source of life for the people (Fig. 7). Located at the crossroads of the city's main road, this village is a fresh unspoiled oasis for the urban area around it. Sustainability of life in Kampung Naga is guaranteed by maintaining the culture and customs of life by optimizing natural resources and balancing natural nutrients and maximizing green space for agriculture including urban farming.



Fig. 7: Ciwulan River
Source: Sudarwani et.al, 2022

- b. **Energy strategy:** For traditional villages such as Kampung Naga which are located in a natural environment, there is an abundance of oxygen as natural energy. One of the reasons for not using electricity is the danger of an electrical short circuit which can immediately burn down the houses whose materials are prone to fire. The settlement has a grid pattern where the circulation path between houses leads to the West and East which in the village becomes a wind channel that spreads to the walls. Hollow cubicle is ideal for air circulation in the building (Fig. 8). However, the unlimited wealth of the solar energy can certainly be processed to produce solar energy to be environmentally-friendly and provide sustainable lighting at night.



Fig. 8: Circulation Path Between Residential Houses in Kampung Naga
Source: Sudarwani et.al, 2022

- c. **Water efficiency:** In terms of (saving) water in Kampung Naga, it seems that there is no need to think about it because water flows in abundance. Water supply is adequate because the water source is constantly gushing and flowing. What needs to be considered and observed is the substitution. Using the same channel, the same water is used for various purposes: drinking water, cooking, washing, fishing and for livestock. Natural water conservation has already been started. It is suggested to prevent water pollution or reuse of water by reprocessing water in the rain-fed area, reusing water from baths to water plants, and reducing excessive water use to anticipate climate anomalies. Water conservation in Kampung Naga is needed because many tourists visit the village, which is considered a tourist village. Modern society with all its behavior can cause disturbances in the environmental balance.
- d. **Waste management:** Kampung Naga has become a tourist village where many visitors are scheduled to visit regularly. Logistic services and the need for cultural performances make the village crowded. This also produces a lot of waste, which requires awareness and self-discipline to manage waste from houses to the landfill.



Fig. 9. Garbage Enclosure in Kampung Naga
Source: Sudarwani et.al, 2022



Fig. 10. Trash Cans in Kampung Naga
Source: Sudarwani et.al, 2022

- e. **Materials:** Materials for buildings are available on site, ranging from river stone, wood, bamboo, coconut trees, palm leaves, to coconut shells. River stones from the river are used for pedestal foundations, as well as the road swales. These materials are all available in residential areas. If it is damaged, it can be repaired immediately. Likewise, river stones can be taken from the river without the need for energy.



Fig. 11. Stones used in the Houses in Kampung Naga
Source: Sudarwani et.al, 2022

- f. **Community neighborhood:** In order to meet their living needs, people of Kampung Naga must build social relations with fellow residents, as well as residents outside of Kampung Naga. This is accomplished by promoting urban farming, selling agricultural products, doing reforestation, establishing waste banks, and building parks or green open spaces as places for gathering.



Fig. 12. Gate in Kampung Naga
Source: Sudarwani et.al, 2022

- g. **Economic Strategy:** Through empowerment in agriculture, livestock and fisheries, the community needs to learn to process agricultural products into unique products of Kampung Naga. Plant cultivation for food diversification is not for consumption by the people of Kampung Naga but can be marketed outside the village, or as souvenirs for the tourists who come to the village. Natural resources such as bamboo, wood and other products can also be processed more creatively. Homestay is the main attraction, because in addition to the shape of the house, tourists can also experience life in Kampung Naga.



Fig. 13. Saung Lisung in Kampung Naga
Source: Sudarwani et.al, 2022

- h. **Preservation of culture:** Preserving culture and customs is part of the life of the people of Kampung Naga. The benefits are that when culture and customs are maintained, sustenance for each community is also felt. For this reason, the preservation of customs and culture is non-negotiable. Revitalization of traditional houses is regularly carried out.
- i. **Operational management:** Building maintenance and building maintenance technology systems are quite good. Building maintenance involves a simple technology to increase durability, building stability and security. Management in terms of maintenance and the use of natural resources can also be seen in the management of drainage, clean water, waste and waste that do not contaminate each other, but can maximize its benefits.

6. Application of Sundanese Architecture in Contemporary Buildings Design

The principles of Sundanese architecture in Kampung Naga and its applications in contemporary architecture are as follows:

- a. Kampung Naga has received architectural design certification energy-efficient green buildings, awarded by the Green Building Council of Indonesia (GBCI). Characteristics that include the arrangement of the site, the direction of the house, door openings, organization of space and provision of building materials. Characteristics passed down from generation to generation by their previous ancestors had implemented sustainable aspects. It shows that the building occupants, in this case Kampung Naga community and their behavior are crucial components in the Kampung Naga built environment.
- b. Kampung Naga has ecological characteristics that are still being maintained. They include the natural forest area, Kampung Naga residential area, the forms of the building which still reflect Sundanese architecture with deep meanings, the material use, and the boundaries of the division of the residential area and diverse biological natural resources that can be found in terms of the rice fields, gardens, or the yard of the house. They fulfill their needs of nutrition and medicinal plants. This is the pattern of the settlement of Kampung Naga.
- c. There are nine principles of sustainable architecture in Kampung Naga, namely: urban ecology, energy strategy, water management, waste management, materials, environmental community, economic strategy, cultural preservation, and operational management.
- d. Contemporary architecture is a blend of two styles, namely modern architecture and traditional architecture: in this case, Sundanese architecture. Modern in architecture is applied through sustainable aspects: the use of natural products and energy in a way that does not harm the environment, which are still becoming today polemic in the urban society. Traditional architecture is applied through the building typology of Sundanese architecture and the building materials which are from the locality. All the materials are available in the local area and are relatively eco-friendly.

Conclusion

Kampung Naga is a village that is still inhabited by people who strongly believe in ancestral customs. The Kampung Naga residential area is surrounded by terraced rice fields and forests. Ecologically, the village pattern of Kampung Naga reflects the environmental pattern of the Sundanese society which is generally found in the rural areas. In this pattern, there are three important elements that support each other in fulfilling their daily lives, namely the house as a place to live, a water source that is always available and gardens and ponds where fish are kept. Because the Kampung Naga settlements are clustered in one predetermined location, the land allocation in the village spatial plan is further emphasized based on principles of efficiency by not ignoring ecological factors in maintaining environmental balance.

Almost all of the building materials are from the locality. They are available in the local area and are relatively eco-friendly, except for certain parts such as nails and glass for shutters. Therefore, it can be categorized as meeting the criteria as a sustainable architectural design that is still passed down from generation to generation without destroying the land/Nature around the

village. The activities of the Kampung Naga community involve managing crops, livestock, water and others as well as a source of life. In the Kampung Naga area, apart from agricultural land, there are also plots of fish and catfish ponds around the house. In this pandemic era, many people practice farming at their homes and thus, it can be said that the local wisdom of the Kampung Naga community is very special and also helps in dealing with the pandemic period. It also supports food security in Kampung Naga. The concept of sustainable architecture in Kampung Naga, arises from the residences, environmental management, and infrastructure, and is in line with the concept of green buildings in the current era.

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