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Local Wisdom in Global Era
Enhancing the locality in Architecture, Housing and Urban Environment

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FOREWORD

It is an honour for Department of Architecture, Faculty of Architecture and Design, Duta Wacana Christian University (DWCU) at Yogyakarta, Indonesia; to be the host of CIB International Conference on Local Wisdom in Global Era. The Conference being run by the collaboration among Faculty of Architecture and Design DWCU, Institute of Technology 10 November Surabaya (ITS), International Council for Research and Innovation in Building and Construction (W110 CIB), and Nusantara Urban Research Institute (NURI). The theme “Enhancing the Locality in Architecture, Housing, and Urban Environment” provides papers and presentations on a wide range of topics indicating the breath and scope for both research and teaching within the area of architecture and the built environment.

Actually this Conference would be held on November 26-27, 2010. Due to the eruption of Merapi Volcano since October 26, 2010; especially the most dangerous eruption on November 05, 2010; the Conference has been rescheduled to January 21-22, 2011. We thank you for your kind commitment to this Conference.

These proceedings have been prepared from the papers provided by more than 60 presenters accepted from approximate 135 abstracts from about 10 countries. Finally, on behalf of the Department of Architecture, Faculty of Architecture and Design (formerly Department of Architecture, Faculty of Engineering) we thank you to all contributors to the Conference: CIB, ITS, NURI, the members of Steering Committee and Organizing Committee as well, International Reviewers, all presenters and participants, and last but not least to all members of Duta Wacana Christian University for their generous supports. Without them, this Conference would not be possible.

Prof. Ir. Titien Saraswati, M.Arch., Ph.D.
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Editor
INTRODUCTION

The incongruous impact of globalization towards the existence of indigenous and national resource has gained international interest. Efforts to restore the quality of the threatened environment for the living have raised concerns on finding local strategies to understand and manage the impact world widely. Unfortunately, the most common answer to this situation cannot be done only by a single discipline. In term of design, it is not enough to give solution to the problems unless we deal with the uniqueness of the social, economic, and cultural context of the local community in each country.

One of spatial characteristics of urban areas in developing countries is the emergence of slum areas and squatter settlements which are only seen partly in the urban development. These settlements are occupied by the poor working in informal sectors around the city centre. These people demonstrate great ingenuity in developing their residential neighbourhoods, organizing open spaces and constructing their houses, even though the government views them as illegal. To view the poor not as a problem requires honest and good motivation. This International Conference explores new paradigms which focuses on enhancing and fostering local knowledge and wisdom for sustainable developments in Architecture, Housing, Urban Design as well as Urban and Regional Planning.

AIM AND SCOPE

The Conference discusses and critically examines the phenomena occurred in Architecture, Housing, and Urban Developments within developing countries. Sub-themes might be related, but not limited, to the following topics:

A. Indigenous Architecture as a Basic Architectural Design
   - The use of Local and Recycled Materials
   - Innovative Building Construction
   - Traditions and Vernacular Architecture
   - Sustainable Design and Construction
   - Indigenous Strategy for Disaster Preparedness

B. Informal Settlements as a Basic Development for Housing Improvement
   - Self-sufficient Built Environment
   - Pro-poor Housing Policy, Planning and Efficiency
   - Parametric Computational Tools for Sustainability
   - Total Participatory and Advocacy Development Planning

C. Harmony with Nature for Sustainable Urban Development
   - Assessment for Sustainable Urban Planning and Design
   - Man-made and Natural Environment in Harmony
   - Sustainable Urban Greenery
   - Appropriate Technology for Sustainable Built Environment
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LOCAL WISDOM IN “WETLAND ARCHITECTURE”

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ABSTRACT

Vernacular architecture is the architecture derived from life values and culture that exist in a particular place. Therefore, vernacular architecture is believed to have and keep a variety of local knowledge that have been tested in overcoming various problems related to the natural environment. If current day, a variety of issues related to human life in the built environment were found that should be constructed to see how far the local wisdom has been observed in all the planning and design of the existing. Natural environment, sometime cause problems in human lives, is also keeping potential solution to this problem. It is very important to understand various heritages of local knowledge, particularly stored in vernacular architecture, of the community to create a harmonies’ life between human and built environment. This study aims to reinvent the forms of local knowledge that derived from the architecture that evolves on wetland environment. The vernacular architecture that was studied is Banjarese dwelling in South Kalimantan. Local knowledge is tested in this study arrested through cultural expression of wetland environment. The result can be sustainable development concepts and guidelines for areas that have wetland characteristics.

Ke words: local knowledge, wetland architecture, Banjarese dwelling, sustainable development.

I. INTRODUCTION.

Currently, in general, the quality of life in Indonesia’s cities, for example: Jakarta, Surabaya, Bandung, Semarang and other cities tend to decrease. In some news of televisions and newspapers showed the frequency of congestion due to limited land, pollution and poor air quality due to the lack of trees, flooding due to loss of
water catchment areas, decreasing the damage to the road surface and bridges, and many other disasters that disrupt the comfort and security. These disasters occur in succession without interruption and in many parts of the city.

In general perspective of architecture, this condition is a result of human failure on managing relations of natural environment and built environment. Built environment tends to be built by expense the natural environment that causes disruption of natural balance.

Each of natural environments has a specific characteristic that could be a problem of human life but it is fair to claim that human have wisdom in treating existing environment. Although the characteristic of a natural environment could be a problem for human life, surely the natural environment also provides a solution. For that reason, the traditional society was considering how to life harmony with the nature, learn from the nature, and harness the potential of nature to human welfare.

People live in the natural environment differently, ranging from high mountains, snowy areas, dense forests, arid deserts, mountain rocks, shore, and above water (river or sea). Amos Rapoport (2006: 179-180) identified, at least, there are 1278 built environment due to different set of environment. Vernacular architectures show how the traditional society can be consistent and harmonious coexistence with nature.

Back to current, the conditions seem no longer available. Harmonious living with nature no longer exists and people tend to compete to conquer nature. For that reason, this study aims to find the forms of cultural expression in the vernacular architecture and to understand how harmony of life is created. This research takes one of the environmental conditions to human habitation that is a wetland environment.

II. METHOD
This study uses qualitative-naturalistic approach. It is based on the assumption that human life and relationship with nature are an interconnected and cannot be separated. Data obtained from field observations on the architecture that grew out of the wetland environment. In addition, some information collects from an interview related to cultural and community life within the wetland. Furthermore, the data were analyzed by correlation analysis between the physical architecture and the cultural aspects of community-life.

III. WETLAND and WETLAND ARCHITECTURE
According to the Ramsar conference, wetland is a land that is naturally or artificial always waterlogged, either continuously or seasonally, with still or flowing water. According to Maltby (1986), wetland is a place that is wet for enough time for the development of vegetation and other organisms to specifically adapt. Meanwhile, according to Cassel (1997), wetlands are defined by three parameters: hydrology, hidrofitik vegetation, and hidrik soil. In addition to the watery conditions, wetland
environments generally have a level of very high biodiversity, both flora and fauna. In addition, the wetland area is generally a fertile land that so often opened, drained and converted to farmland, rice fields and ponds. Included in this wetland, among others; swamps, marshes, peat, etc, while the water that flooded the wetlands can be classified into freshwater, brackish or salty.

With a very specific condition, the wetland area has a function and a huge benefit to human life. According to Dugan (1990), the functions of wetlands are (a) the recharging of ground water, (b) the release of groundwater, (c) fixation of sediment, toxic substances, and nutrients, (d) recreation and tourism, (e) controlling flood, (f) controlling erosion, (g) producing biomass, (h) protection against storms and winds barrier, (i) maintaining micro climate.

Indonesia has about 396,462 km² of wetlands (approximately 20.8% total area of Indonesia), which are mainly in Sumatra, Kalimantan, Sulawesi, and Papua. Based on the functions and order of its environment, the typology of wetlands (especially in Indonesia) can be divided into 6 (six) types (Poniman 2006), namely; tidal swamps, seasonal swamps, alluvial plains, meander belts, peat swamps and marshes, and floodplain.

Figure 1. Maps of wetlands in Indonesia
Source: Poniman, 2006

In South Kalimantan, there are approximately 96,451 km² of wetland areas that which Banjarese society life.
Since past time, wetland environments, especially rivers, have become a source of livelihood for most of the Banjarese in South Kalimantan Province. All the Banjarese activities depend on the river even to this day. One of the most prominent is the dependence of economic activities such as trade, livelihoods, and transportation. This activity has spawned a variety of forms and functions of the boat, fishing equipment, and forms of social communication that is very specific, and many other aspects of life. Environmental conditions or habitat of the rivers and swamps have been shaped the culture of Banjarese and known as the river-culture community. For that reason, all the elements of Banjarese culture can be traced the relationship with the river environment.

Figure 2. The life of Banjarese community depends on the river. 
Source: Researcher, 2009

In addition to physical, the natural environment surrounding the Banjarese community also has an abstract meaning in the context of the mystical. Banjarese community believes the existence of a supernatural world in human nature as well as lives. However, they believed about the natural environment is often not fully trusting the source can be found in the teachings of Islam (the Qur'an and the sunnah of the prophet). The beliefs that are not found in the Quran and Hadith derived from their ancestors and also from the miracle of the kings of Banjar.

Physically, the wetland environment affects the system of building construction, while the non-physical effect on the comfort of staying in the house. The effects of wetland environment on the building can be seen in some parts of the house of Banjarese society. This is it the “wetland architecture”.

IV. LOCAL WISDOM in WETLAND ARCHITECTURE
4.1 The Foundation

The construction of the foundation of Banjarese houses, especially the high ridge house, is a form of physical culture of the people living within the wetland (swamp). Knowledge and technologies were developed to overcome the problems of poor land carrying capacity. The sized of building, the volume of building and the weight of building materials become something that is very critical for the construction of foundation. To hold and distribute the weight load of the building to the earth gravity used to log foundation system. Log foundation system usually uses the wood of kapur naga which was placed as a cushion. The nature of wooden beams that can "float" the building makes it very functional. While the strength and durability of wood are naturally formed by the natural process of curing the wood sink into the mud / swamp.
In this way, it is proved that the durability of wood can last up to hundreds of years. For a lighter weight of the building, *kacapuri* foundation system is used. This system uses a smaller block of wood, generally ironwood (*ulin*), that is arranged in longitudinal and cross in each row of columns in which the wood will be installed.

Figure 3 Construction of foundation logs (left) and construction *kacapuri* (mid & right)

4.2 The floors
Construction of the floor is designed distantly spaced. The floor in *surambi sambutan*, the room behind *anjung jurai kiri room*, *pedapurran* room, and *palatar balakang* is designed distantly spaced, so that the water can easily flow to the ground.

Figure 4. Installation of floor boards: estranged
Source: Researcher, 2009

4.3 The wall
Construction of the wall is installed vertically. Among all the rooms, wall as the building cover (other than as a barrier) is made of iron wood (*ulin*) boards placed vertically. This is to make the water fall / flow down and not leave water trace in the joint of the board.

Figure 5. Erection of a vertical wall
Source: Researcher, 2009
4.4 The Roof,

The roof or in Banjarese “hatap” is a major part that becomes a distinctive feature of various types of Banjarese traditional house. The roof of *bubungan tinggi* house is generally distinguished by its parts and the application. The roof that stands tall and has a unique shape is the *bubungan* roof. The *bubungan* roof has a slope of up to 60°. While other parts of the roof are slightly slope, ranging from the slope of 15°. This roof structure and composition describes the purpose of accelerating the fall of water from the middle of the building. In addition, the shape becomes very unique. Roof covering materials used are relatively light. At first, people used the leaf of “rumbia” as roof covering material. Because of the shortage, especially the durability of the “rumbia” leaf, this material is slowly starting to be replaced. Supported by the environmental conditions which are rich in wood, ulin, besides used as the material for building structure, was also used for roof covering materials. The creation of *sirap* is the wisdom of Banjarese people. The remaining pieces of ulin are used as roof covering material. With a very simple technology, *sirap* is made by cutting the wood (ulin) into thin pieces. Basically, it isn’t only advantageous, but *sirap* is also very functional. Shingle roof covering material (*sirap*) has a high durability, which is able to last up to 10 years, it is light, and it is easily repaired if leakage occurs. From the aspect of structure, the use of shingle roof (*sirap*) can solve the problem of stability of buildings on the land, which is very weak. At the time when the Sago leaves (*rumbia* leaves) were used, the wind problem was very crucial. The roof from *rumbia* leaves is made by tying the leaves into a bond. After that, all ties are attached to the construction of the roof (roof/rafter). To overcome the wind problem, wooden beam is put at the top of the roof. The roof covering at the top of *bubungan* roof creates a cross. This technology is actually one of the characteristics of the vernacular that can be seen in public houses all over the countryside, including in *bubungan tinggi* house. In a further development after the use of nails to reinforce the connection, the wooden beam is no longer used. Today, the cross wooden beam is replaced by eaves and is only considered as an aesthetic element, known as “layang-layang”.

![Image of various Banjarese houses](image-url)

- a. Bubungan Tinggi
- b. Gajah Baliku
- c. Palimbangan
- d. Anjung Surung
- e. Balai Bini
- f. Joglo
Banjar houses are scattered along the river banks. Some people even build a settlement on the water in the form of home *lanting*. While some others began to settle on the mainland, some Banjarese still life on the banks of the river and overlooking the river. Each house has direct access to the river via the bridge and pier.

Environmental condition of rivers and swamps causes problems for Banjarese who want to build settlements. This condition makes Banjarese try to create the culture of constructing a building that is rooted from local knowledge. This is implied in the concept of Banjarese house construction which is made entirely of local materials and technology. The construction materials entirely use local materials that can overcome the problems caused by water. For example, the use of iron wood and *galam* is an option on the potential of local wood, which is extremely powerful if immersed in water. While the construction technology is "created" in accordance with the demands of the natural environment, ranging from the foundation, body building, to the roof.

With the specific environmental condition, which is marshland that has a very weak bearing capacity, the level of difficulty in making public housing construction is also a problem for Banjarese people. Nevertheless, the solution derived from this condition is very good. The foundation technology of "kacapuri" overcomes the problem of land capacity. All of this constructing culture is in fact the wisdom of local culture that is developed as an acculturation of the various cultures. The construction forms a united system of framework structure that is very stable and has a stiffness of both vertically and laterally. Vertically, the long building is capable of standing on a weak land bearing capacity. This certainly requires a very high skill to take into account the possibility of building an uneven decline. Laterally, the building could withstand the heavy burden of building between the front, middle and back of the very potential to cause a lateral load.

To support the argument that Banjarese public housing was built based on the consideration of logic, natural environment, the potential of natural materials, the characteristic strengths and weaknesses, technology, etc, we can understand how a building can be established through the study of construction of the house of Banjar society, particularly *bubungan tinggi* house;
Illustration of the construction of Banjarese houses explains how constructing culture is formed as a result of the wetland environment. Starting from the problem of low carrying capacity of the land where the building will be constructed as generally in the form of swamps, the difficulty of transportation to bring building materials, to the technical construction problem have been imagined. But as the knowledge develops and supported by the environment potential in the surrounding area, those problems can be solved.

In constructing a building, Banjarese people use the term cerucuk foundation system to solve the land problem. While the material galam wood and ironwood are even more durable and stronger if it is in the water. As for the construction
techniques, since the wood is used, people then use pivots system (watun) which can create structural rigidity. The other solutions to environmental factors can be seen from the construction of a steep roof, wall mounted vertically to accelerate the collapse of water and avoid damage to walls, to the gradual construction and installation of floor mounted far apart to overcome the problems of water and air circulation / humidity.

V. CONCLUSION
There are so many forms of local wisdom lie in wet architecture, which is the realization of Banjarese culture. In construction aspect, the local wisdom is shown by keeping the balance of the building and water. Starting from the grand-standing structure, the foundations structure give space for water to absorb and flow, floor construction allows the evaporation and the fall of the water, and the wall and roof construction make the water flows easily. With all these constructions, traditional Banjarese people can live harmoniously and preserve their environment. All forms of the local wisdom that lie in the Banjarese houses can be developed along with the development of the material technology. In this way, the effort of constructing a building without damaging the environment can be reached.

REFEERENCE