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Improvement of Riverbanks and its Effect on Building Configuration
Case Study: Malay Sultanate Palaces in West Kalimantan, Indonesia

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ABSTRACT

The architecture of early Malay sultanate palaces in West Kalimantan reflected along adaptation process to the riverbanks environmental conditions, characterized by constant flooding, swampy land, and high humidity. Starting from 1922 to 1937 the Dutch East Indie colonial government constructed an embankment system along the riverbanks in order to solve the flooding problem and to improve the environmental health in general. The betterment of environmental condition along the riverbanks had significant affects on architectural form and configuration of sultanate palaces built afterwards. This study will explicate in detail the affects of riverbanks improvement on architectural form and configuration of sultanate palaces in West Kalimantan. Historical-interpretive method is adopted, comparing the architecture of sultanate palaces built prior to and after the construction of embankment. The results of study showed that the improvement of riverbanks as technological intervention of the Dutch East Indies Government has a far-reaching impacts, including the development of road system and economic activities, the increase of colonial revenue, and the change of sultanate palaces architectural form and configuration.

KEYWORDS: River embankment, building form and configuration, Malay sultanate palaces, West Kalimantan

1. INTRODUCTION

The history of Malay kingdoms in West Kalimantan started with the establishment of Tanjungpura Kingdom in the beginning of 9th century at the estuary of Matan River, followed by other kingdoms in the north coast and along the Kapuas River. In the 16th century, under the influences of Islamic sultanates of Palembang, Johor, Brunei and Bugis, these kingdoms were transformed into the Sultanates [1][2]. Since the early kingdom period, the river had become part of the Malay people's lives. All of their activities were carried out along the riverbanks. The river also served as communication and transportation lines, which facilitated the distribution of economic goods and the spread of culture and religions, including Hinduism, Buddhism and Islam. Waterway transportation were much more efficient at that time compared to road transportation system which were hampered by forested and inaccessible lands.

In sultanate period, locations of the palaces were frequently relocated from one place to another, following the instruction of the sultan or dictated by the conflict of power within the sultanate. Locations of the palaces always situated on the river banks, in particular along Kapuas River, which was considered as having better accessibility, economic values, and security. Historically the architecture of sultanate palaces were developed in adaptation to the river banks environmental conditions which were characterized by constant flooding, swampy land, and high humidity. The sultanate palaces were built on stilts, with deep pile foundation, and breathing walls and floors to reduce the humidity. As a matter of fact, for many centuries building on stilts was a typical solution for all structures built along the riverbanks.

Since 1849, all Malay sultanates regions became part of *Westeer Borneo Residentie* (province) under the authority of Dutch East Indie government. The powers of Malay sultanates were strictly confined to local affairs. The dominant power of Dutch East Indies government compelled that all decisions pertaining to Malay sultanates to be approved by the Governor of Borneo [1][2][3]. Dutch East Indie government assigned supervisors (*controleurs*) for each sultanate palace region. During the first two decades of 20th century, the Liberals in the Netherlands insisted that the ethical policy to be implemented

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in the colony. One of their concerns was the improvement of public health. Accordingly, the Dutch East Indie government constructed embankment system along the riverbanks in order to solve the flooding problem and to improve the environmental health in general. This measure had improved the environmental conditions along the riversides and had indirectly affected the form and configuration of the Malay sultanate palaces and its living cultures.

The purpose of this study is to explicate the affect of riverbanks improvement on architectural form and configuration of sultanate palaces in West Kalimantan, and to examine its implication to the living culture of sultanate palaces. The result of this study would contribute to the knowledge on the dynamic adaptation of sultanate palaces to their immediate environmental conditions.

2. MATERIALS AND METHODS

The Malay sultanate palaces in West Kalimantan were listed as building heritages with great historical as well as cultural significances. Hence, the study will involve the explanation of their historical development, starting from their establishment period until today. Three Malay sultanate palaces were chosen as case studies, namely 1) *Matan* Palace in Ketapang, 2) *Al-Mukarramah* Palace in Sintang, and 3) *Alwatzikubillah* Palace in Sambas. Locations of the three palaces were shown in Figure.1.

Figure.1. The Location of Research Case Studies
Source: Researcher, 2016

This study was conducted using historical-interpretive method. Historical data collected comprises archives, oral histories, manuscripts, maps, photographs, and other sources. Interview and field survey were also carried out as complimentary methods [4]. Diachronic and synchronic analyses were conducted to delineate the architectural development of sultanate palaces and to identify influential factors that characterized the transformation of sultanate palaces before and after riverbanks improvement made by the Dutch East Indies government.

3. RESULTS AND DISCUSSION

Contradictory to the early researches on housing at the riverbank of West Kalimantan, which were mainly focused on building on stilts as the only type and its variants[5][6], this research explores the transformations of building on stilts to building on pedestals, as a logical consequence of technology intervention implemented by the Dutch colonial government to improve the environmental condition along the riverbanks, and its far reaching impacts.

Early Conditions of the Malay Sultanate Palaces in West Kalimantan

In line with the development of their trading activities, the sultans had to relocate their palaces from the tributaries to the Kapuas River, in order to have better access and security for their economic activities. The new sultanate palaces were generally situated on locations far from upstream and downstream of the river were unsuitable for human settlements, due to the strong water currents, rocky condition at the upstream, and high sedimentation at the downstream [7][8].The *Al-Mukarrammah* palace in Sintang and the *Alwazikubillah* palace in Sambas were located at the junction of tributary(see Fig.2),which have a strategic advantage to control the security of the region and the inflow of vessels from downstream to the port. The position of the palace was at the center of the intersection, facing directly to the downstream.

Figure. 2. The Locations of *Al-Mukarrammah* Palace and *Altwazikubillah* palace at the Junction of Tributary

Source: National Library of Indonesian Republic, 2012; Researcher, 2016

The locations of early human settlement were mostly determined based on myth, belief, and way of life of their inhabitants, rather than on utilitarian grounds [9]. Consequently the building had to be constructed adapting to the unfavorable environmental conditions. In case of Malay sultanate palaces, the buildings were constructed in adaptation to hot humid climate, heavy rain fall, monsoon seasons which come twice a year, in order to provide thermal comfort for their inhabitants. Buildings were constructed on stilts in response to flooding problem and humid ground, large openings were provided for good cross-ventilation, roof overhang were made and trees were planted to provide maximum shading.

The riverbanks were part of mesic mainland areas, which are prone to flooding caused by river overflow due to high tide and heavy rains. Therefore the surfaces of land surrounding the palaces were always wet and muddy, with unfavorable air quality characterized by high humidity (see Fig.3). Meanwhile hot air coming from evaporation of the river aggravated the condition of microclimate surrounding the palaces.

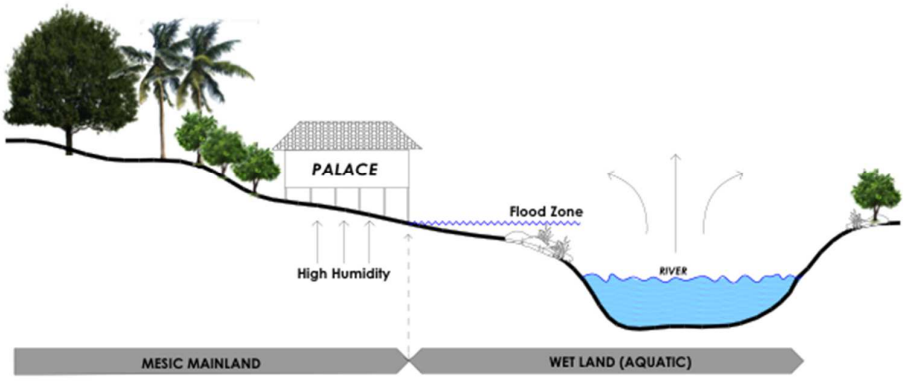

Figure 3. Early Conditions of River Banks Environment

Source: Researcher, 2016

In response to flooding risks and also hot and humid climatic conditions, buildings in the sultanate palaces were traditionally built on stilts, with floor level between 1.5 to 2 meters from the ground (Fig.4). The early *Matan* Palace in Ketapang had floor level around 2 meter from the ground (Fig. 4a), meanwhile the early *Al-Mukarrammah* Palace in Sintang had around 1.5 meter (Fig.4b) and *Altwazikubillah* Palace in Sambas had around 1.2 meter (Fig.4c). High floor level was purposefully constructed as a solution to avoid direct contact with wet and muddy ground surface and also to provide natural air circulation to reduce humidity and improve the thermal comfort in the interior.

(a) (b) (c)

Figure 4. Sultanate Palaces Built on Stilts With Floor Level Up To Two Meters
Source: Field Survey, 2012

All buildings of the early sultanate palaces were constructed from wood, a local material that was abundantly available. Major elements of the buildings such as main columns, beams and floors were specifically made of ironwood (*kayu ulin*) which is water resistance and highly durable. Walls were made from vertical or horizontal wooden planks with some space in between to provide cross ventilation, exchange of fresh air, and to maintain thermal comfort in the interior (Fig.5a). Cross ventilation causes evaporation process, which can lower the temperature on the human skin [10]. High ceiling was constructed to provide ample air volume and to ease airflow in the interior. Pitched roof was adopted to quickly discharge rainwater and to provide attic space for heat insulation (Fig.5b). Roof and gable ventilations were provide to get rid of heat radiated from roof (Fig.5c).

(a) (b) (c)

Figure 5. (a) Wooden Planks Wall, (b) Pitched Roof and (c) Roof Vents
Source: Field Survey, 2012

Improvement of River Banks and its Affects on Building Configurations of the Sultanate Palace

In 1849 all Malay sultanates in West Kalimantan were placed under the authority of Dutch East Indies government, consolidated into the *Residentie of Westeer Borneo* (West Borneo Province) comprising 20 landscapes (*landschappen*), namely the landscape of *Pontianak* (Sultan), *Kubu* (Tuan), *Sambas* (Sultan), *Landak* (Panembahan), *Mempawah* (Panembahan), *Tayan* (Panembahan), *Sanggau* (Panembahan), *Sekadau* (Panembahan), *Sintang* (Panembahan), *Silat* (Prince), *Suhaid* (Prince), *Selimbau* (Panembahan), *Piasak* (Prince), *Jongkong* (Prince), *Bunut* (Prince), *Simpang* (Panembahan), *Sukadana* (Panembahan), *Matan* (Panembahan), *Melawi* (Prince) and *Kapuas Hulu* [1]. For each landscape, the Dutch East Indies government assigned an *asisten residen* or a *kontrolir* as its representative, signifying

that all Malay sultanates were politically subordinated to the power of Dutch East Indies government in West Borneo [1][2][3].

Following the implementation of ethical policy, starting from 1922 to 1937 the Dutch East Indies government launched massive projects to improve the wellbeing of people in the West Borneo. One of the projects was the construction of embankment system along the riverbanks in order to solve the flooding problem and to enhance the environmental health of the people in general. Parallel to this project was the renovation of existing palaces of Malay sultanates and the establishment of new palaces. Subsequently the three new palaces established were the sultanate palace of *Matan* in Ketapang (1922), of *Alwazikubillah* in Sambas (1933) and of *Al-Mukarramah* in Sintang (1937) [12][13][14]. The Public Works Department of Dutch East Indies Government (*Burgerlijke Openbare Werken*) was responsible for the design and construction of new palaces. The riverside embankment was fully constructed from wooden piles and sheets, particularly along the property of sultanate palaces and the settlement areas,to protect them from flooding and to ensure that the ground surfaces were no longer wet and humid(Fig. 6 and 7).

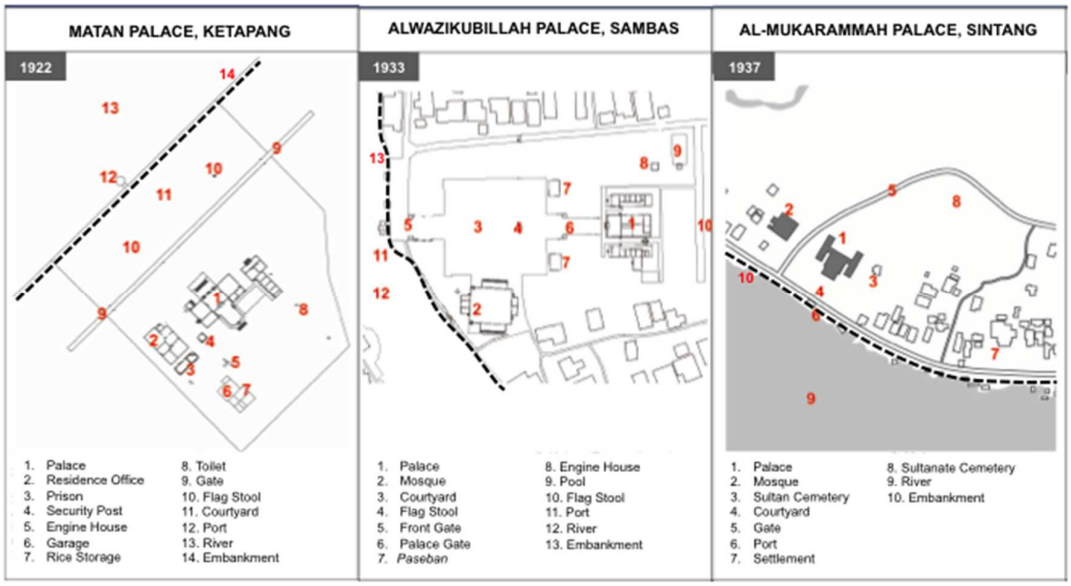

Figure 6. The Construction of Embankment at the Palaces Sultanate Area
Source: IAI Kalimantan Barat, 2002 [14]; Researcher, 2016

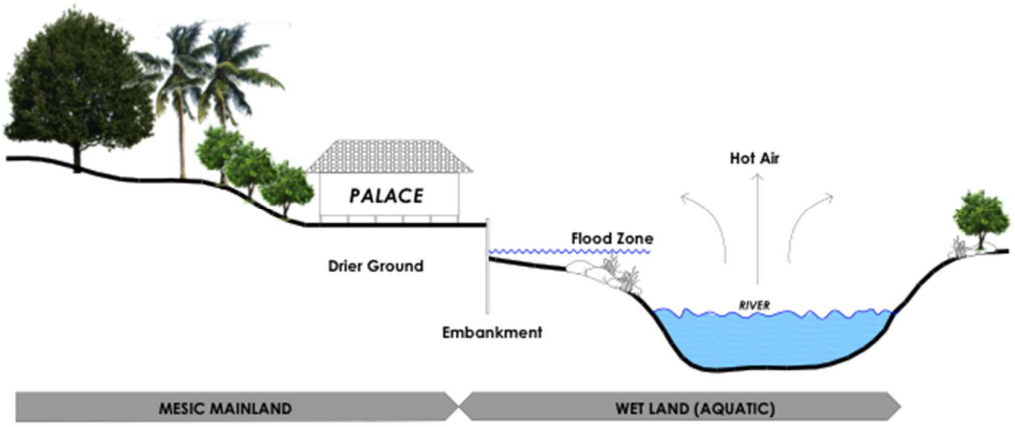

Figure 7. The Conditions of River Banks After the Embankment Construction
Source: Researcher, 2016

Canals and ditches were also dig out to drain the surface water into the river. Consequently flooding risk and stagnant water surface can be eliminated, and the level of humidity can be reduced significantly, so that there was no reason to construct building on stilts anymore. With the improvement of land surface, The Public Works Department (BOW) can develop a new alternative for the building system and architectural configuration of sultanate palaces. Buildings no longer needed to stand on wooden stilts of 1.5 – 2 meters height, but on low stone pedestals less than 1-meter height (Fig. 8 & 9a), so that house yards can be accessed from different sides of the building through verandas and small steps. It should be noted that previously access to the building was only limited to front and back entrances using narrow wooden ladders.

Figure 8. New Palaces Built by Dutch East Indies Government (*Matan* Palace, *Al-Mukarramah* Palace, and *Altwatzikubillah* Palace)
Source: Field Survey, 2012

Walls can be made from plastered wood frame and metal strips, or wooden planks sealed by mixed lime. Openings can be made large and wide using wood panels and lattices for doors and windows (Fig. 9b). Gutters and downspouts were added to the roof drainage system. Rainwater was collected in the reservoirs, to be utilized as alternative water supply (Fig. 9c). Drainage system was installed surrounding the building to discharge surface water to the nearest canals or ditches.

(a) (b) (c)
Figure 9. (a) Pedestals Foundation, (b) Large Doors and Windows,(c) Water Reservoir
Source: Field Survey, 2012

The improvement of ground surface quality was not only affected the omission of stilts, but also the architectural configuration and expression of the palaces as the whole. Relation between buildings and site became more intimate, interior space and exterior spaces were closely connected through big wall openings, verandas, terraces, and corridors. As a result, building facades were also significantly transformed into modern expressions. The architectural configuration of the palaces comprised two or three buildings; one building situated in the middle was generally functioned as the main building, while the others as supporting buildings. To adapt with the conditions of tropical climate and provide adequate natural ventilation, buildings were made slim and long, laid out in parallel position, perpendicular to the riverside (Fig. 10).

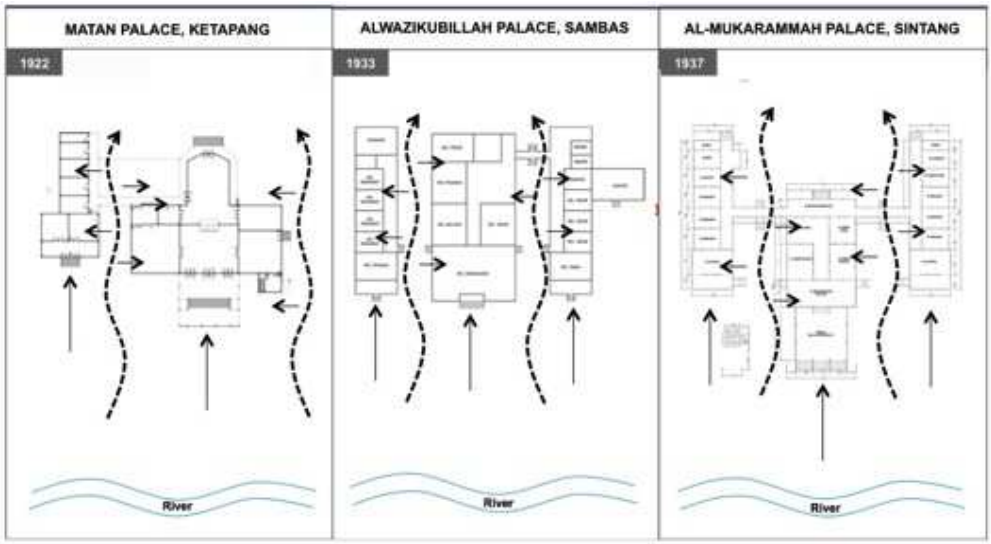

Figure 10. Palaces Form and Configuration to Maximize Air Circulation
Source: Field Survey, 2012; Researcher, 2016

The Development of Road System and the Change of Living Cultures

The improvement of land surface quality as the result of construction of embankment has made the development of road system possible, so that distribution of economic goods no longer depended on waterway transportation. Construction of road system also opened new opportunities for the establishment of private enterprises such as rubber and spice plantations, gold and coal mining. Hence, the construction of road system contributed significantly to the revenue of the Dutch East Indies government. In line with the Land Reform Regulation 1870 [15], the Dutch East Indies government had the authority to lend or transfer the ownership of unproductive properties, properties outside the authority of sultanates, and the properties owned by the indigenous people, to the private enterprises. Business relationships between the Dutch East Indies government and the sultanates were basically based on capitalistic outlook.

Migration from waterway to road transportation system implied a shifting of way of life and cultures of the sultanate. Boats and vessels became obsolete to be replaced by cars, garages replaced boathouses, and official chauffeurs replaced royal guards. Hence, cars became the official vehicle of the sultanate. Initially royal boats were still maintained for ritual purposes, but to be abandoned in the later stage. The Dutch East Indies government provided cars and garages as part of the sultanate palaces facilities, symbolizing their patrimonial attitude and dominant power.

(a) (b)

Figure 10. (a) Garage Space at *Matan* and *Altwazikubillah* Palaces; (b) Boat Mooring Covered by Soil at *Al-Mukarramah* Palace
Source: Field Survey, 2012

4. CONCLUSION

As part of implementation of ethical policy, the Dutch East Indies government had constructed embankment to improve the riverbanks conditions and environmental health in general. This technological intervention improved surface land quality and made possible the development of road transportation and alternative buildings system, form and configuration. The architecture of sultanate palaces underwent significant transformation from building on stilts to building on pedestals, from single to multiple buildings, from wooden to plaster walls, from narrow to wide doors and windows, from simple to integrated drainage system. The Dutch East Indies government attained three benefits from the implementation of ethical policy. First, the improvement of environmental quality surrounding the sultanate palaces. Second, the developments of road system and economic activities, and the increase of revenue. Third, the legitimation of colonial dominant and hegemonic power.

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