

TROPICAL ENVIRONMENTALISM OF THE 'MALAYU' PUBLIC REALM- A RECONSTRUCTION OF TRADITIONAL URBAN CLIMATIC 'SANCTUARIES'

Puteri Shireen Jahn Kassim

*Kulliyyah of Architecture and Environmental Design
International Islamic University Malaysia
Email: puterishr@iium.edu.my*

Illyani binti Ibrahim

*Kulliyyah of Architecture and Environmental Design
International Islamic University Malaysia
Email: illyani@iium.edu.my*

Kamariah Kamaruddin *

*Kulliyyah of Architecture and Environmental Design
International Islamic University Malaysia
Email: kaymaria55@yahoo.com*

Elias Salleh

*Kulliyyah of Architecture and Environmental Design
International Islamic University Malaysia
Email: elias@iium.edu.my*

Norwina Nawawi

*Kulliyyah of Architecture and Environmental Design
International Islamic University Malaysia
Email: norwina@iium.edu.my*

ABSTRACT

The 'Malay kedatuan' refers to the traditional administrative centres of the Malay world which represent the public realm of a socio-cultural urbanized realm of the past. 16th century Melaka, 18th century Kedah, Terengganu and Riau-Lingga centres had at one time, constituted Sultanate-centered urban configurations, which now exist only in partial reconstructions, documents, lithographs and models. Surviving forms include Alor Setar, parts of Kota Bahru and Kuala Kangsar (Malaysia) and Pontianak, Kalimantan. 'Archetypical' refer to recurring generic configurations in which palaces, key buildings, were sited close to each other concerning river and sea. These sanctuaries embody key bioclimatic principles characterising the age-old 'climatic fit' of the Malay house, which were also reflected in such archetypes, which remain less discussed in the field of urban design. The traditional Malay public realm had mainly centred around palaces, and represent the axis of life during traditional times. These have now undergone extensive postcolonial layering. The paper reports on a reconstruction process which attempts to reconstruct the 'vernacular' including building and urban spaces, to learn from past traditional archetypes that have approximated the ideal tropical city, which utilised ecological resources to characterise urban spaces and had achieved comfort conditions through key passive means and key environmental features, such orientation, urban configurations, pathways, public space, shaded spaces and bioclimatic architecture. The paper highlights these features as lessons towards low carbon strategies in townships which can represent a model of reductions in life cycle impact of both architecture and urban design in the tropics.

Keyword: sustainable city, urban comfort, vernacular model, urban tropical, the Malay urban form

INTRODUCTION

In an era without electrical energy, past urban-architectural form of the traditional vernacular world had approximated highly sustainable and acclimatised urban settlements and core configurations. While present urban-architecture structures in the urban center respond more to national, commercial and symbolic agendas (Jahn Kassim, et. al, 2018), past urban centers had contained highly refined passive strategies which were practiced and configured in order to achieve substantially cooler and optimized environmental conditions for the comfort of the past ruling elites under the challenging hot, humid conditions. The resource-constrained conditions of the past were harnessed to allow comfort under the humid tropics. Yet there is a lack of studies to objectively analyse and verify these strategies. Winarto, Santosa and Ekasiwi (2014) had studied the climatic wisdom of the Majapahit settlement in Trowulan, while Abdul Majid and Denan (2015) had uncovered how the average ratios of 'solids vs voids' of Malay ornamented panels in Malaysia were intuitively optimized to reduce heat gain and glare while still providing adequate daylight under Malaysian conditions. While these had focused on individual buildings, in an era of urbanization and multi-storey constructions, the impact of layout of large-scale buildings and interspersed urban spaces are also crucial to achieve comfort conditions under a challenging hot, humid climate. The traditional Malay public realm, which were once governed by the Sultanates, had also approximated dense urban cores. The term 'bandar' or "towns" generally used to represent such

urban centers, do not adequately represent the spiritual-nuances of these centers of settlement – all which had a spiritual connotation and sacred ambience during pre-colonial times. Nordin(2004) had suggested that during and after colonialism, there was a rupture of these centers, as Colonialist had inserted roads into the urban cores with a purpose to deflate these ambiances which had shored up the Sultan's symbolic presence. Thus roads had been purposefully built across key spaces, i.e. between palace and mosque, yet such strategies had irrevocably affected the environmentalisms within the urban core. The rupture the spiritual nature and heightening of the core enclaves surrounding the Malay palace had also affected the long term 'sustainability' and control of urban heat-island impact of such urban centers. Andaya (2008) usefully refers to the word '*kedatuan*' to represent these past royal-spiritual centers, arising from the basic term '*datu*'. The spatial connotation of the word emerges from the word '*Datu*' which carry the connotation of a royal leader and hence '*kedatuan*' is a royal present with a boundary. Andaya (2008) describes how such royal centers would have certain concoction of elements within which drew in the presence and positions of other sub palaces and administrative structures into the center to which they would gravitate or orbit. In the Malay traditional world, there were no distinctive physical boundaries between ruler and people, forts were constructed beyond such enclaves and thus the people could feel the presence of the boundary of the ruler's court.

The nearest English term is proposed for precolonial urban centres as 'sanctuaries' rather than 'towns'. These '*kedatuan*' had not only contain buildings and structures but utilised a range of extensive greenery, gardens, urban design principles designed and configured to ensure optimal comfort physiologically and psychologically to the inhabitants of these centers, and to ensure their everyday function and well being to serve and administer on behalf of the monarch and his administrators and families. Typically these principle had been reflected in large buildings though climatically inducing optimal orientation and had been filled with varied forms of landscape and greenery. As a parallel, one can compare how these royal sanctuaries played the same role as the principal sanctuaries of ancient Greece.

However the Malay world had no distinctive priestly class. By the time Islam came to South East Asia, trading and commercial opportunities had heightened and escalated the development of centers within a series of '*negeri*' that combine both political force and spiritual centres and which were centred in the same boundary. These had organically evolved and developed, and at times, historically evolved from the nucleus unit of the Malay kampong. It became the large pattern of the organic kampung and its center, reflecting organic morphological patterns of the accretion of settlements, which had evolved and varied to contain the urban centres. These '*kedatuan*', basically public functions, clustered around palaces, including mosques and artisanal centres. While these have been argued as 'organic' and 'without clear patterns', there are studies that have relooked at such patterns to find recurring configurations, and which highlights the need to relook into the wisdom of the past, to derive lessons for the future. It is contended that these royal sanctuaries can further highlight the local and vernacular roots of environmental, tropical passive and bioclimatic strategies for urban design. They represent principles in which ecology and climate are harnessing to the maximum for an emerging or planned township, neighbourhood or tropical city. The paper attempts to reconstruct and review such reconfigurations of several Malay '*kedatuan*' or urban core of old, key sustainable and bioclimatic architectural features, which made up on an 'original' tropical city with elements, features and forms that can be discerned and these seem to be approximating a past sustainable dense urban form in the equatorial tropics. These features can be used to create lessons not only for new developments but to elevate its present urban conditions regarding forms of shade and public space which is crucial to achieve its green or sustainable city status of the future.

METHODOLOGY

The following study analyses, review and discuss on the alignment of past '*kedatuan*' with climatic strategies of place, in line with past writings on the key 'environmentalism' of past Malay settlement. Two urban cores are focused, 16th century Melaka reconstruction, and the reconstruction of urban center in Alor Setar during the 19th century. The orientation of palace and mosque with respect to key natural features such as river, sea and hills are discussed. Other writings are compared with the layout and reconstruction, and series of studies were undertaken around the reconstruction of Malay towns and are used to reconstruct the environment as it were in the past, which approximate the Malay-tropical '*kedatuan*'. Though there are many unknowns particularly with 16th century Melaka, some of these towns still have features that are unchanged from the 17th century, though many of the surrounding structures were destroyed, certain documents and photos which allow a good reconstruction. The reconstruction centres of interest as found at Melaka, Kuala Kangsar, Pontianak, Kalimantan and Langkat, Sumatera are also reported in Jahn Kassim et.al, (2018). The orientation of palace of Melaka were debated by earlier researchers. One of the researcher (Noor, 2013) explained that the orientation of the palace was towards Melaka town, which is northeast direction, as the palace should orientated to the city of Melaka, furthermore, the hill side that opposite to the coastal area was too steep and impossible to the people to climb up to the palace. However, the earlier version which is from Sejarah Melayu (1967), the orientation are following the southwest direction, and consistent with the finding by Sulaiman et al. (2007). The one done by (JahnKassim, Ibrahim, Harun, & Kamaruddin, 2018) show the consistent direction with Sulaiman et al. (2007), but the position should be in line with the bridge. As there were Portuguese sources (Castanheda, n.d.) also claimed that Alfonso de Albuquerque had positioned his ship right from the bridge and shot the cannon directly to the mosque. As mosque located opposite to the palace, so these two was diminished due to the attack. Thus, from the text, the palace was to be located directly to the bridge, which is also at the southwest direction.

RESULTS

1. Melaka and its tropical environmentalism

16th century **Melaka** represented a dense urban entrepot due to past trading and maritime routes. Due to the massive destruction by invading Portuguese forces in 1511, including the burning and destruction of the medieval bridge and palaces, the **original sustainable features** of the Melaka city, is lost and reconstruction is not possible without deduction from similar maritime and riverine Malay polities of the past. It is argued that while it is impossible to reconstruct it accurately, the existing evidence such

as lithographs and textual descriptions are used, including travel notes by travellers and traders, recall the density of its buildings and populations when seen from the sea. There is a lack of key documentation evidence evolving from the era of the Melaka city till the present time, yet a reconstruction can be attempted to produce demonstrated morphologies, which point to the topicality of medieval urban design and urban landscape, which embodied essential principles of tropical forms of sustainable urbanism. During the 14th to 16th centuries was the golden age of Melaka, a city that grew from its maritime economy, and became the epicentre of the Malay world. The city is the core centre of traditional systems of life which existed alongside palatial gardens and grounds which can be argued as represented the beginnings of an urbanised tropical city form. Its forms and language were medieval Malay, yet many of its forms can be explained as those which evolved, developed, and refined into an expression of a Classical vernacular 'nagara' of the South East Asian region. It holds deep lessons to cities in the tropics search for regional urbanism within the rapid modernising, and urbanising region of South East Asia. Hon. E. J. Stanley's translated the MS. attributed to Duarte Barbosa but remarked the following.

'It is especially interesting for the description of the Malays, so often regarded by ignorant people as savages. The MS. dates from the beginning of the sixteenth century: —"This city of Malacca is the richest trading port and possesses the most valuable merchandise, and most numerous shipping and extensive traffic that is known in all the world. Moreover, it has got such a quantity of gold that the great merchants do not estimate their property nor reckon otherwise than by bahars¹ of gold, which is four quintals each bahar. There are merchants among them who will take up singly three or four ships laden with very valuable goods and will supply them with cargo from their property. They are very well made men and likewise the women. They are of a brown colour and go bare from the waist upwards, and from that downwards cover themselves with silk and cotton cloths, and they wear short jackets halfway down the thigh of scarlet doth, and silk, cotton, or brocade stuff, and they are girt with belts, and carry daggers in their waists wrought with rich inlaid work ; these they call queries. And the women dress in wraps of silk stuffs, and short skirts much adorned with gold and jewellery, and have long beautiful hair. These people have many mosques, and when they die, they bury their bodies. Their children inherit from them. They live in large houses and have gardens and orchards and pools of water outside the city for their recreation. They have got many slaves who are married with wives and children. These slaves live separately and serve them when they need them. These Moors who are named Malays are very polished people, and gentlemen, musical, gallant, and well proportioned,"

1.1 Reconstruction

Melaka had evolved similarly from its village-like settlement into much higher densities around its main transportation routes, river and the sea. Its sudden growth due to the socio-political system and economic dynamics of the time, orbited and gravitated around royal palaces and centres, which must have been more axially planned since this constituted 'elements of urban life and formal urban spaces. As one moves away from its centre, its density finds sudden decrease and intersperse by narrow pathways and multilevel architectural forms, and facades. The urban sustainability read from this estimated morphology of Melaka as a maritime city, was processed and challenging as evidence was scarce, yet through textual evidence, 'a visual impression was gained and using CAD tools, the overall morphology of a maritime 'port' city was highlighted. There are several key elements the orientation of the palace, the open green 'padang', and the density around water bodies were elements which was seen not only as bioclimatic but a refined expression of Malay culture. (Milner, 2008, Andaya 2008). The Malay socio-political structure, and hence its urban form, reflect the condition of the ruler being the centre of the Malay political system and the longevity of institution guarantee the survival of the society. Malay subjects considered themselves not in states or governments but in a 'Kerajaan' which can be defined as a system or 'the condition of having a raja'. Milner (1982) describes how: 'The Malay rulers reflected the organising principle in the Malay world'.

Wiryomatomo (2012) described Melaka as 'probably one of the best examples of Southeast waterfront city with multicultural populations. Melaka, the first entrepôt of Southeast Asia. Moreover, the meeting point of international trades between East and West. ...geographically, Melaka is neither a fertile land for agriculture nor a strategic position for sea and land defence.... Hence the position of Malacca an important meeting point between East and West that stood out from the rivals such as Pasai, Aru, Banten, and Palembang was the Malacca's connection to and protection from the Chinese Empire under Ming Dynasties as earlier as 1405.' (Ricklefs 2001:23) Summed up "Malacca was probably the first and an authentic example of an entrepôt state in Southeast Asia; it did not have signed its commodity and its existing populations The urban structure and its fabrics must have been the outcome of cohesion, negotiations, collaborations, and contestations of power. Undoubtedly, Bandar is historically the outcome of cohesion, negotiations, collaborations, and contestations of economic and political forces that must have been incorporated with the special institution of syahbandar.'

1.2 Historical process- reconstructing from Textual descriptions

1. "Melaka's rapidly expanding volume of trade, effective administrative structure, safe anchorage, and reasonable taxation system, ensured that it became a fabulously wealthy entrepot in the 15th and early 16th centuries. At the height of its commercial activity, Melaka in the words of Barbosa was "the richest port with the greatest number of wholesale merchants and with most shipping and trading activities."

Source: M. L. Dames (ed.), *The Book of Duarte Barbosa*, Hakluyt Society, London, 1918, p. 175.

2. "As depicted by the written sources, in Melaka the local population and the foreign traders lived in separate residential quarters. In this connection, Tome Pires and Eredia speak of Bazaar Jawa, Kampung Kling, Kampung Pasai, and Bukit China. In the northern region of Sungai Melaka, there was an area called Upeh which was divided into two sections. In this particular area, the people from northwestern Asia, the Chinese, Javanese (Tuban, Japara) and the Malays of Palembang

settled themselves. On the other hand, the Javanese of Grisek lived in the district of Ilir which represented the southern part of the Melaka River. Besides Upeh and Ilir, another district known as Sabak was the area in which most of the local population concentrated while the Cellats were to be found in the coastal, marshy and swampy lowlands. So mixed and varied as the population of Melaka, that eighty-four distinctive languages (perhaps including various dialects) reportedly were spoken there."

Source: Nik Hassan and Yahaya Abu Bakar, « Melaka as a historic City », p. 107.

3. "For instance in the Sejarah Melayu, Melaka was described as follows; "The city of Melaka at that time flourished exceedingly, and many foreigners resorted thither..... such was the greatness of Melaka at that time, in the city alone there were a hundred and ninety thousand people, to say nothing of the inhabitants of the outlying territories and coastal districts."

Source: C. Brown (tr.), Sejarah Melayu, The Malay Annals, Oup, Hong Kong 1976, p. 151.

4. Varthema who claimed to visit Melaka in 1506 A.D. had this to say about the port; "truly I believed, that more ships arrived here than any other place in the world, and especially there came here all sorts of spices and an immense quantity of other merchandise".

Source: Sir Carnac Templs, The Itenary of Ludocivo Varthema of Bologna from 1502 to 1506, The Arganout Press, London, 1928, p.84.

5. "Aroujo's long letter which was smuggled out from Melaka explained in detail the account on Melaka's trade. At any time, he wrote, between 90 and 100 junks (juncos), big and small, and some 150 praos (prahus) entered the port. It was also known according to him that between 30 junks and some more prahus belonged to the king of Melaka and native merchants.

Source: Yahaya Abu Bakar, "In Search of the Flor de la Mar", pp. 22-24.

6. 'As to the question of habitation and settlement around Melaka port, Aroujo made known to us that here, one can see at least 10, 000 houses which were situated along the coast and the river of Melaka. This description of Melaka is further enhanced by Giovanni who among other things mentioned; "the town is situated near the sea-shore and thickly strewn with houses and rooms, and it stretches for three leagues which is most beautiful to see"

Source A. Bausani, Lettera di Giovanni da Empoli, Roma, 1970, p. 132.

7. We need to refer to the earlier Chinese documents of the 15th century which provide a glimpse into the settlements of the local inhabitants. According to these Chinese sources the Malay 'houses are raised on one-storey platforms and lack a layer of planks (against the ground), but a floor of split coconut-palms is erected and lashed with rattan- exactly as if it were a sheep-pen at the height of about four-feet'.

Source: Harry Benda and John Larkin (eds.), The World of S. East Asia, Selected Historical Readings, Harper and Row Limited, N. York, 1967, p. 16.

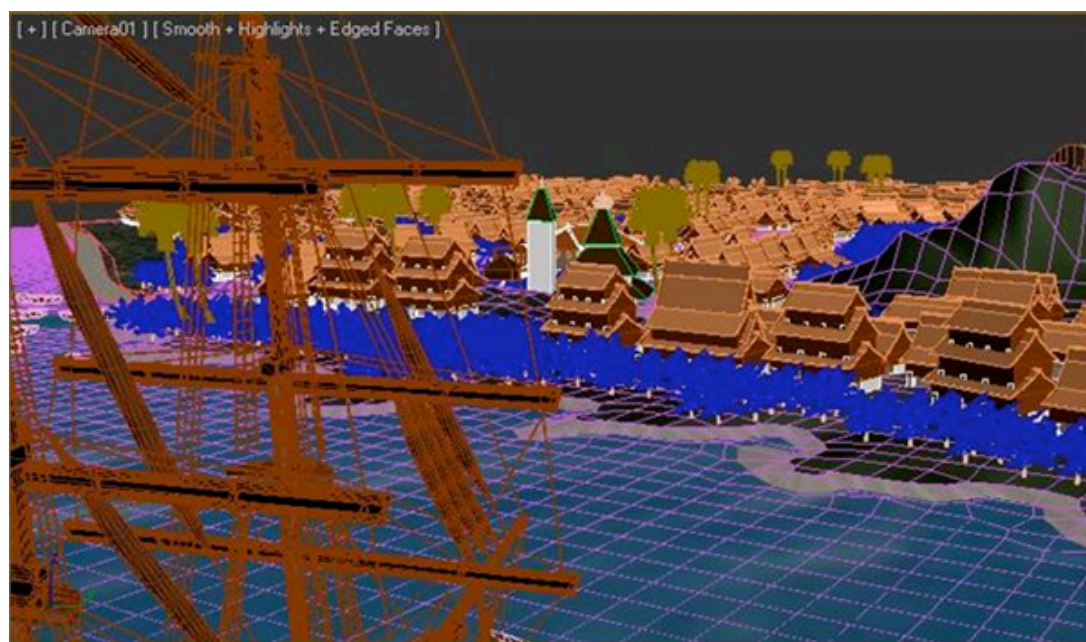


Figure 1a. Reconstruction of 16th century key buildings and city density from the lithograph of. Melaka 1509; 3D model structure from the lithograph which predates the

attack Portuguese, and based on the drawings of Diego Lopes de Sequeira from Portugal.

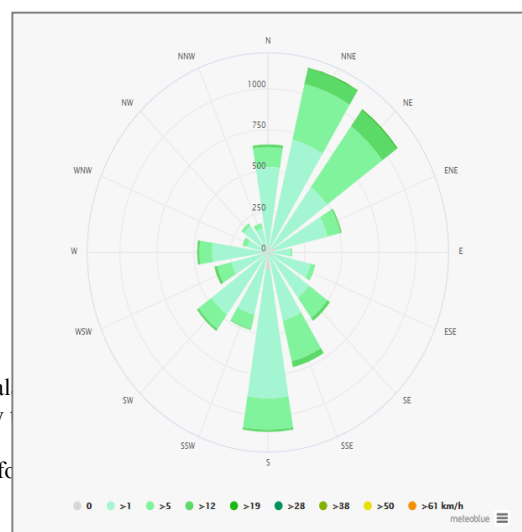
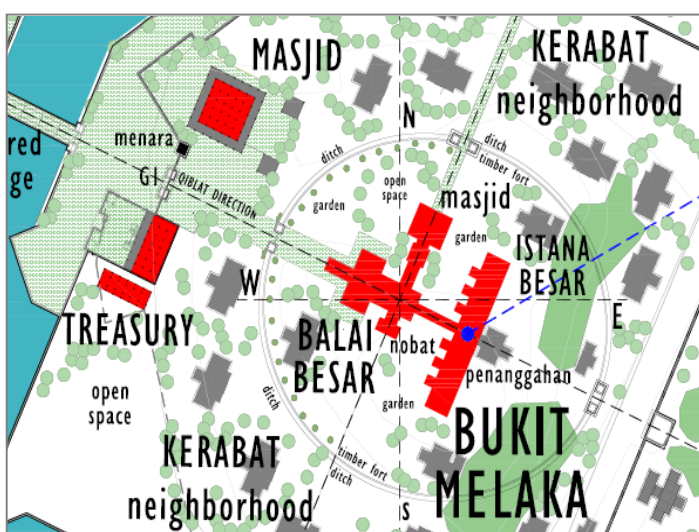


Figure 1b. Zooming into the lithograph visualisation by Leoopez de Sequeria showing the profile of the Malay city and suggesting the high density of the Melaka townscape as seen from the harbor and anchored trading ship, which show a large fortress, densed houses, multistorey buildings, decorated with roof spires and finials, sentry towers and a domelike profile suggested the fusion of dome and tiered pyramidal roof in a semblance of a mosque.

To approximate its urban form, it was observed that the city-state Melaka was not located in inland geographical setting, and has lost most of its traditional patterns. Based on Andaya (2008)'s argument of how the Malay polity often approximate the 'mandala' system or a random 'galactic' layout of buildings surrounding a palatial epicenter, Melaka's morphology was reconstructed based on the traces of mandala system in the state polity were likely apparent with significant adjustments; the *Seri Nara Diraja* (the ruler) was surrounded by four cardinal dignitaries: -*syahbandar* (port authority), *bendahara* (prime minister), *temenggung* (chief of state security), and *laksamana* (navy commander). The structure of state polity must have been symbolically incorporated in the urban form or the site plan of the city centre. Ancient lithographs depict Melaka such as the sketch of Lopez De Sequira, a dense city with 3 to 4 storey height buildings. The lithograph of the illustrates 16th-century skyline of Melaka, showing key building such as palace and mosque s is used as a basis to arrange key buildings (Figure.1)



Figure 2a. Reconstructing 16th century Melaka – Estimating the urban morphology of the Melaka maritime city – 16th century



At its core are its palatial architecture, surrounding aristocratic mansions and palatial grounds from which the city grows, approximating a natural organic growth, with densities around the water bodies. Rather than the imprint of invaders, dominant rulers or fortified complexes, the city appears to be set lightly in its environment. The Malay city reflects a degree of organic planning while its core centre is often axially planned. Principles of sustainable urbanism are now known to include a degree of

organic planning which is more attuned to the hot and humid nature of the tropical conditions. They are surrounded by gardens and pathways which feature tree-lined streets and tree canopies which completely shade the pathways and hard pavement surfaces. (Figure 2a) In the Malay palatial structure and layouts, the axial order (as Figure 2b) particularly assert itself within the organic grain. Some argued as being oriented to kiblah, at the time it was built upon past pre-Islamic patterns. What is evident is that the Malay-based urban planning often approximates a minimal disturbance to the environment, and reflecting the ethos 'touching the earth lightly'. Climatically, the orientation of massing of the key palace **was optimised such as longer facades were a face in prevailing wind directions**.

Comparing the wind patterns of Melaka town as in Figure 2b, and the approximation of the orientation of palace and mosque, from past documents, it is clear that these key **buildings of the Malay public realm were optimally massed, configured and sited to harness airflow patterns within the site to create acceptable ambient conditions through** bioclimatic design, and to ensure year-round comfort. Any axial readjustment was merely asserted for security reasons and generally perhaps to symbolise the Malay Sultanate (as per Figure 2b) as views from the sea and other buildings in the vicinity. Surrounding structures as attempted to be modelled in Figure 4 and 5, refer to the 'urbanised' forms into complex structures, are a configuration of buildings, palaces and gardens which feature elements which reflect principles of climatic and environmental rationale inline with the tropical hot, humid context. The resultant urbanscape and roof dominated forms are at once, sustainable and symbolic, representing the forms that can be argued as a kind of vernacular urbanism. Spaces and zones for the public and private, and the palace and its complex are themselves are small quasi-cities, emerging as small dense districts (such as the port district, the Javanese district and the upper district is known as the centre of learning of old Melaka) merged to form several cities within a city-settlement.

2.0. Alor Setar – the 17th and 18th century urban core

Malay palaces are known for their 'projecting promenades' and its theatrical-like audience halls, enclosing greenery and gardens which play a central role in creating the traditional urban enclave. The Malay proverb '*biar mati anak, jangan mati adat*' is often misunderstood to mean how the Malays would rather 'save face' than their own kin, yet it is a reflection that socio-culturally, the Malay culture had attuned the ways they govern their politics govern with, and through, ceremoniality, and **intricacies of 'adat' and 'pomp', rather than acts of assertion**, and power through tyranny, oppression or even destruction. From the estimate morphology, like Melaka, Alor Setar, Kedah (Figure 3) also reflects the organic nature of the Malay settlement. Both grew at a different rate, yet Alor Setar, a smaller Malay city, reflect a degree of organic pattern while its core center is often axially planned, yet currently disturbed by Colonial construction of a main road through the central padang.

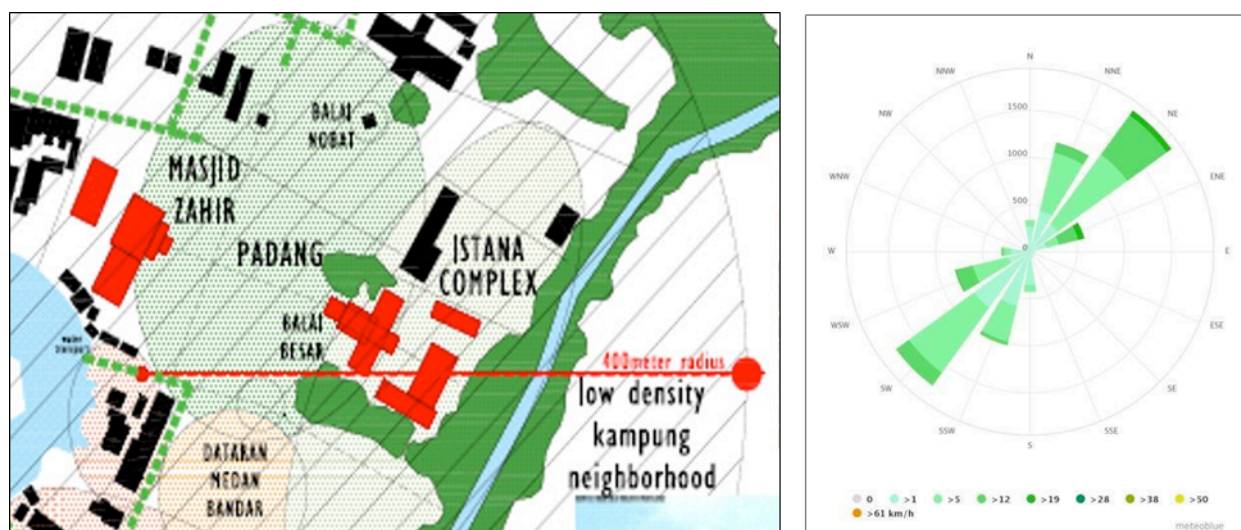


Figure 3. Urban layout of Alor setar showing the orientation of palaces, showing how structures were oriented towards optimal harnessing of prevailing winds as per annual pattern of wind rose for Melaka

Both palaces consist of a series of individual buildings arranged around a central padang, yet connected by fully covered walkways reflecting a specific hierarchy in urbanscape, demonstrating how a complex building massing can be connected however indicated a unity between traditional Malay, neighbouring and eclectic elements.

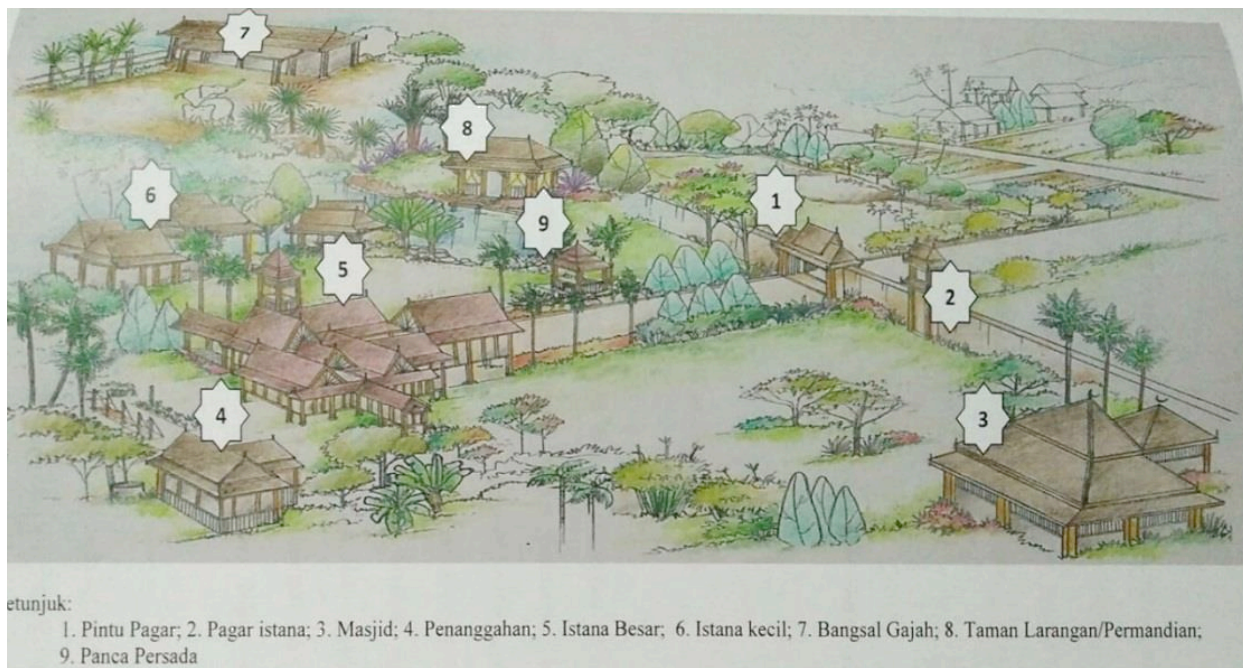


Figure 4: Past visualisations of the palatial grounds and its elements



Figure 5. Reconstruction of Melaka urban center showing Palace, mosque and buldings – (residential buildings and bridge not too scale.) (reconstruction of Melaka based on the lithograph of Lopez de Sequeira. Diogo Lopes de Sequeira (1465–1530) was a Portuguese fidalgo, sent to analyze the trade potential in Madagascar and Malacca, he arrived at Malacca on 11 September 1509. He left the next year when he discovered that Sultan Mahmud Shah, the local Sultan of Melaka, and Melaka itself. This further drove Alfonso de Albuquerque the opportunity to embark upon his expeditions of conquests. Sequeira was subsequently made governor of Portuguese India (1518–1522), and in 1520 led a military campaign into the Red Sea which hastened the first legitimate Portuguese embassy to Ethiopia.

Present principles of sustainable urbanism have noted how criteria of sustainability aligns with the advantages of organic planning (Hillier, 2014) Under tropical conditions in Malaysia, the multidirectional nature of wind patterns (Figure 2b,3) would need multidirectional clustering of buildings and multiform massing of key buildings to capture winds throughout the year. A higher degree of organic planning reflects a more fragmented urban form, catching the multidirectional winds, to alleviate stagnant air in urban spaces and hence more attuned to the hot and humid nature of the tropical conditions. Further cooling is

achieved by green spaces, recalling semi-enclosures surrounded by gardens and pathways which feature tree-line streets and tree canopies which completely shade the pathways and hardpaved surfaces (Figure 6). The more organic grain or grid would mean the orientation of buildings are multidirectional, with a prevailing direction towards the sea, this then allows natural ventilation into many buildings. Many of these buildings would benefit if they were facing the river, rather than parallel to the river with grains perpendicular to the river for the dispersing of windflow from the river itself.

Public architecture in the 'climatic sanctuary'

The positioning of the Balai Besar, Alor Setar, the public realm – particularly the open-air section of the palace and its orientation and alignment with the mosque, open space and river- recalls principles of climatic and environmental rationale in the tropics. The positioning of the palace had been optimized to maximize prevailing windflow into internal spaces, while a buffer collonaded space is created around the innermost internal spaces. While in Melaka, the structure itself is fragmented and encourages natural ventilation from all directions due to the dispersion of wind, in Alor Setar, the wind regime is mainly coming from NE and SW throughout the year (Figure 3). The Balai Besar of Alor Setar has an elongated and optimally oriented form in terms of the audience hall and this part of the palace extends significantly forward to capture the cooling impact of prevailing winds. There are always large trees to shade the windows, but which do not highly obstruct such ventilative cooling. The base of the audience hall is masonry, which acts like a heat sink and this masonry based further continues as a central core series of masonry arches that further acts like a heat sink. As the peristyle structure totally shades **the internal masonry core, the core acts optimally as a sink as it is never exposed to solar radiation. Thermally and climatically, masonry structures which are never exposed to solar radiation are reversed as 'heat sinks' rather than 'urban heat island sources.** Although the Melaka palace no longer survives, heritage structures such as the Masjid Kampung Hulu and Masjid Tengker, also approximate this dual-strategy of thermal masonry mass as core, while surrounded by timber collonaded spaces. The roof, and its eaves extends far beyond the occupied space, allowing an interior mass to be totally shaded without any incident of direct radiation on its structure. This reverses the urban heat island long term effects of masonry absorption and allows the ground floor to be both public space and the occupied space as the open nature of the ground floor mass also allows air from the nearby river to cool the ground floor and its structures.

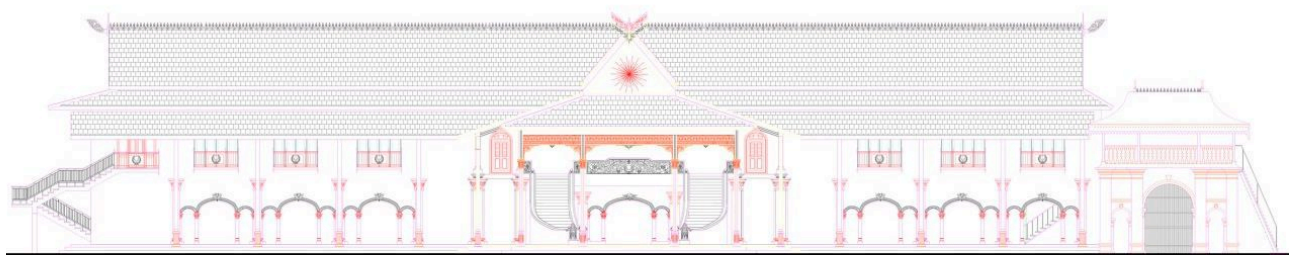


Figure 6. Balai Besar Kedah, showing multilayered form, massing and an open air ground public realm.
(Source : IIUM Heritage Lab, 2005)

Architecturally the ground floor reflects a permeable zone which open the movement and pathways yet allowing a degree of cooling in the tropics due to elevating the ground floor (Figure 6). The 'kolong' or open ground floor resonates the principle of facilitating airflow in occupied areas and allow transitional spaces to be cooled through open ventilation and at time, become spaces that reduce the risk of destruction in the event of floods. The siting of the palaces is environmentally significant and crucial, and many are adjacent to rivers and enjoy the cooling effect of water bodies with the comforting panoramic view. The tiered form of the roof, reflect the general climatic feature of a tiered or multivolume roof to maximise its capacity to exhaust hot air and to heighten its stack to cause thermal stratification through stack effect in the tropics. Extending from the palace grounds were known to be shaded completely by shady vegetations, and public spaces were configured surrounding it. Mosque and palace were typically sited and configured within an open green field or alun/arena which was **entirely green and filled with vegetation and grassed.**

Building Materials and the tropical Stylistic 'hybrid'

The lithograph drawing of 1509 had portrayed the Melaka settlements as being a combination of white masonry and wooden plank material. A 3D model of the structure is reconstructed from lithograph the arrival of Diego Lopes de Sequeira, also referred to this Dani Warguide sketch as his version has more Malay element in architecture and detailed, especially the roof. Although the popular depiction of the Melaka palace, seen in repeated reconstruction of the traditional Melaka city, is that of a richly ornamented full-timber palace as per Figure 9 below, due to the abundance of timber in this tropical region, coupled with prevailing hot and humid climate, this full timber form is known as the peak of architectural language and style is always related to the steeply pitch roof, elevated structures and large tall openings of timber buildings and palaces are the epitome of local skills of timber vernacular, many historical works on architecture has inadvertently focused on timber architecture. The house, mosque and palace feature the aesthetic taste and craftsmanship of local architecture particularly of timber related works and products. Malay vernacular thus conventionally conjures up the image of traditional elevated structures in idyllic village settings with timber posts, large overhanging roofs and decorative ventilative windows and panels.



Figure 7a (above) . Popular depiction of the Melaka Palace as a fully timber structure in 'Puteri Gunung Ledang' 2004 movie, (Enfiniti Productions Malaysia , Produced by: Tiara Jacquelina; Shazalli Ramly) cinematography is in contrast with more masonry structures as appearing in the historical documents (arrival of Lopez de Sequeria in 1509). Figure 7b (below)



Within the Melaka original style, the upper portion is timber, within which timber has lower heat absorption properties, while the lower ground is masonry which allows a thermal coupling with the ground and higher water table in order to maximise the cooling effect of the ground and higher water table in the maritime tropics. Yet in the Melaka original style, the ground floor is **permeable in form, though constructed from masonry** (Figure 7) highlighting the extension of the character of vernacular. Such a ground floor not only reflects the principles of a **grounded tropical permeable zone** , **the principle of heat sink, in which a ground-connected structure had utilise the heat absorbing properties of the earth to create thermal comfort for the ground floor. Its architectural form were punctured** which allowed open movement of air and permeable pathways , The combination of strategies was a system allowing a high degree of cooling through both ventilative and radiative forces and daily dynamics in the tropics due to elevating the ground floor . The principles recalls the traditional 'kolong' or open ground floor resonates the principle of facilitating airflow in occupied areas and allow transitional spaces to be cooled through open ventilation . the location of near rivers also contributed although it increased the event of floods from nearby rivers. Similar forms are found in palaces which were the spin offs of Sultanate dynasties of the Malay world after the destruction of Melaka. After the invasion of Melaka, the kingdom splintered into tinier dynasties which relocated in Johor, Perak and Sumatera. Examples as below are Istana Langkat, Istana Batu Bara and Istana Darul Aman of Sumatera.

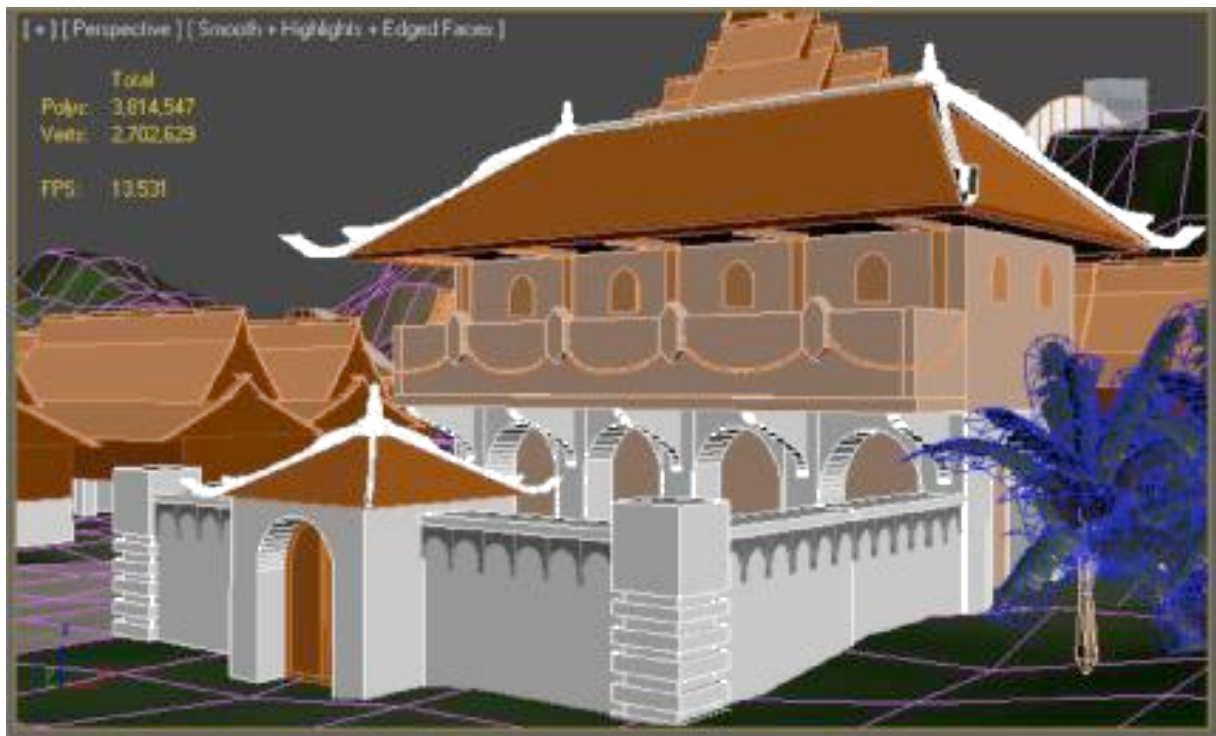


Figure 8. A fully-reconstructed building as appeared in Figure 7b depicts a partially masonry architecture form based on lithographic evidence of 1509 Melaka invaders






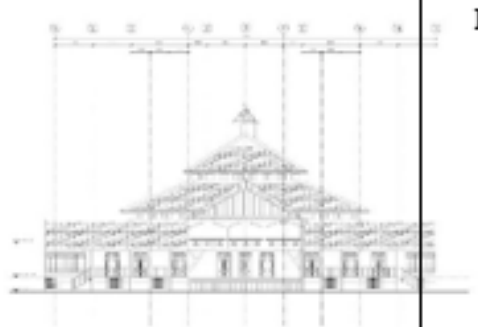


Figure 9 Istana sultan Langkat , Tanjung Pura built by Sultan Abdul Aziz (1900)

Figure 9 and Figures 10 to 15 from Table 1 recall the evolution of timber to masonry hybrid in the architectural language of Malay palaces which are found in the key maritime locations straddling the Straits of Melacca and the South China Sea. Like the depiction of Melaka architecture and its original, many of these palaces depict an optimal climatic form, and some large-scale palaces consist of a hybrid masonry, with upper portions comprising of richly carved and ornamented timber sprawling structures while lower ground floor portions are permeable massive masonry structures. The emergence of a sustainable agenda, however, has brought forward the need to look into more organic and biodegradable and renewable forms of construction and material. The rising standards of low carbon building and development include the criteria of 'embodied' carbon which necessitates local materials and more natural resources local to any site or region

Role of tropical phenomenology.

The overall approach in architecture and urban design recalls the perhaps forgotten principle of past traditions and the crucial role of phenomenology - which in architecture and urban features – can cause and initiate the simultaneous experience , occurrence and optimisation of climatic factors and elements and both comfort and senses from the natural world experience the role of light, air and greenery which has to occur simultaneously in order for its impact to be felt for the social, spiritual, physical and environmental well-being of mankind. These palaces and their extensions of urban space are prime examples of urban sustainability with the inclusion of phenomenology with the surrounding physical elements which are formed and fused to assert identity and alleviate senses that such as the role of architecture, roofscape, greenery elements, gardens, pathways and gazebos blended as one.

Table 1. Palatial archetypes of the Malay world, depicting full timber evolving to hybrid forms.

Smaller scale archetype	Larger archetype	Region
 <p>Figure 10</p>	 <p>Figure 11</p>	Palaces of Riau Lingga palaces
 <p>Figure 12</p>	 <p>Figure 13</p>	Kalimantan and Borneo East
 <p>Figure 14</p>	 <p>figure 15</p>	Malige and Indragiri

CONCLUSION

In assessing past forms, one must not be trivialised or deceived by the simple timber structures and materials. Through Malay architecture and urban design consist of its immediately available materials such as wood and earthen blocks, a look into its forms, through morphologies in both architecture and urban design, will demonstrate sustainable elements. While bioclimatic principles in the tropics are well known as to be rooted in the archetypal Malay house, sustainable principles regarding urban patterns and design are much less rooted in its links to traditional or ‘vernacular’ forms of urbanism. The paper looks at different aspects and dimensions of historical cities or centre of settlements in the Malay region, which are termed sanctuaries, with the aim of highlighting traditional ambience and character. Many of its elements align with the requirements and dimensions of sustainability as per the recent global standards of green urbanism. While traditional city forms and features can be said to be inadvertently climatic and ecological, a more in-depth look is needed. In the tropics in Asia, such urban centres are organic settlements evolving from key centres of the ruling elite, rooted in the feudal systems and politics of the 16th century to the early

phase of the 1900s. In doing so, the paper aims to highlight the challenges in visualising the demonstrated morphologies, urban design and urban landscape, of a traditional South East Asian city and highlight that the evidence of its forms and features are scant, yet if presently seen as ‘sustainable’, these features reflect an embodiment of the essential principles of a tropical sustainable urbanism. The key states of traditional Malay region, in Malaysia and Sumatera which exists alongside the Straits of Melaka and the South China Sea, have been argued as the climatic archetypes of the Malay world. Their urban patterns, including architecture, gardens and grounds can be argued the beginnings of an urbanised world or era, yet still attuned to climatic, environment and ecology represent urban design strategies of tropical which had perhaps reached a zenith, hence a crucial resource in the search for a regional urbanism with sustainable principles in the rapid modernising, and urbanising region of South East Asia.

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