Urban analysis: reading the elements and layers of Asian cities, a case study of Banda Aceh-Indonesia

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Abstract. Asian cities often experience complex urban problems, mainly due to weak regulations to respond to the changes. There is a need to answer these problems. Using Banda Aceh as the case, this study examines the transformation of the city form through reading the urban elements and layers from historical chronological order focuses on the inner city and its surrounded areas. The aim is to identify the physical and non-physical primary elements and the ordinary layers of the city, as well as analyze the symbolical, sociological, historical, morphological layers and their transformation from time to time. Historical and typomorphological methodology were used by comparing maps and building styles supported with photographs collected through a series of field observation and from literature. The analysis was divided into pre-colonial, colonial, post-colonial, and post-tsunami disaster periods. Findings from this study shows that there are three main factors that contribute to the transformation of Banda Aceh: the past international trading activities, colonialism, and the tsunami. This study provides a reference for urban designers and planners to understand the complexity of the urban form of the Asian cities which can also be utilized by policy-makers to control regulations for urban development, particularly in Asia.

1. Introduction

Most of the cities were formed through a complex process [1] defined by various phenomena such as industrialization, urbanization, westernization, colonization/decolonization, nation-building, and natural disaster. This process also took place in Asian cities, which were characterized as multi-layered, hybrid, varied, and continuously changing over time. However, for most cities in the Asian regions, the changes were more influenced by urbanization and nation-building due to colonization than globalization, as was the case in most of the European countries [2] [3]. This influences were reflected in the urban form, including settlements, ports, schools, government offices, public and religious buildings [3]. Furthermore, trading activities also contributed to the transformation of urban and the typology of architecture colonized Asian cities, particularly in commercial Southeast Asian port towns [4]. Ports became the center of activities of the cities. Some of these cities later became cosmopolitan cities, and some declined [4] due to several factors such as political situation, transportation development, and economic degradation.

Asian regions which are dominated by developing countries often experience complex urban problems. The problems occur mainly due to weak regulations to respond to the changes such as land development and political changes [5]. There is a need to answer these problems. The role of urban designers and planners are crucial in this matter.

Using Banda Aceh, the capital city of Aceh Province, Indonesia as the case study, this paper examines the transformation of the city form through reading the urban elements and layers from
historical chronological order. The study focuses on the inner city of Banda Aceh and its surrounded areas. The 'Grand Mosque' and the ‘Dalam’ are used as two key urban elements for the analysis. The aim is to identify the physical and non-physical primary elements and the ordinary layers of the city, as well as analyze the symbolical, sociological, historical, morphological layers and their transformation from time to time.

2. Methodology
The historical and typo-morphological approaches were applied as the main methodology in this study. The historical approach was able to identify the historical layers and changes of the urban form caused by natural disasters, war destruction, or urban development [6]. It was done by comparing maps [5] [6] from different periods. Some photographs were collected through a series of field observation and from literature as archaeological evidence [6] used to support the analysis. Meanwhile, the typo-morphological approach was used to understand the urban tissue as the character of the city. It was done by comparing building styles from different time frames [5]. This approach also helped to identify the changes of architectural features of the city [5]. Moreover, the intangible factors which influenced the urban form transformation of Banda Aceh including cultural, social, economic, physical, environmental and political factors were also examined [7] [5] to give a better understanding of the consequences of the urban transformation process [5].

The analysis of the urban elements, layers, and transformation of Banda Aceh was divided into four periods: pre-colonial period (before the 19th century), colonial period (1873-1945), post-colonial period (1945-2004), and post-tsunami disaster period (post-disaster rehabilitation and reconstruction 2005-2009). These were the most significant periods which had influenced the transformation of the city since the past centuries. Particularly the last period (post-tsunami) which had created substantial changes of the urban layout of Banda Aceh. This study gives a reference for urban designers and planners to understand the complexity of the urban form of Asian cities. A reference that can also be used by policymakers to regulate development which corresponds to the needs of the market, community, as well as changes of the political situation [5] particularly in the Asian regions.

3. Case study
Banda Aceh is the capital and largest city of Aceh province. It is located in the western part of the Indonesian archipelago. Banda Aceh has been recognized by its vibrant character of culture, arts, architecture, and social history for centuries. The city was formerly known as Bandar Aceh or City of Aceh, but when the Dutch occupied the region in 1873, they changed the name into Kutaraja or “the king’s fort” [10]. Following the Indonesian independence, on December 28, 1962, it was changed again into Banda Aceh and remained so until now. Due to its function as the capital city, all the provincial government’s administration, economic, political, social, and cultural activities were concentrated in Banda Aceh [8].
On the map of Banda Aceh (figure 1), it is clearly shown that Banda Aceh is located in the coastline on the western part of Sumatra Island, Indonesia, directly facing the Malacca Strait. The city consists of two parts divided by the main river named Krueng Aceh or Aceh River. The yellow dot is the ‘Zero Kilometer’ of the city which was identified by Mesjid Raya Baiturrahman or Baiturrahman Grand Mosque (figure 2), the important symbol of Banda Aceh. This mosque has been established since the early 17th century. It was firstly built in 1612 by Sultan Iskandar Muda (1607-1636). During the rule of Nurul Alam, the second Queen of Aceh Kingdom (1675-1677), the Mosque was burned down. Later it was rebuilt and again was razed to the ground in 1873 during the second Dutch invasion. To get the sympathy of the Acehnese, in March 1877, the East Indies Governor General offered to rebuild the Grand Mosque with a new style of architecture, changing the tired vernacular roof into a dome. However, the construction only began more than two years later, and it was finally completed in 1883. The Mosque initially featured only one dome and one minaret, but more domes and minarets were added in the subsequent renovations in 1935, 1958 and 1982. Now it has seven domes and eight minarets, including one that is claimed to be the highest minaret in Banda Aceh. Today, the mosque has 32 pillars and covers an area of more than 1,500 square meters. For the Acehnese, the Mosque is not only a worship place but also a symbol of their city and becomes the collective memory of the Acehnese [9].

Meanwhile, the red dot in figure 1 is the marking location of Meuligo (figure 3) or Governor’s Official Residence which was built on the former location of the old Sultan’s Palace or the ‘Dalam’. It was built by the Dutch after they occupied the Dalam during their second invasion in December 1873. They
completely destroyed the old Dalam and built new military buildings in the compound including the Meuligo which was used as the Dutch Governor’s Residence at that time. They also changed the name of the Dalam to Keraton, the common term used in Java referring to the Sultan’s Palace [10].

The black circle is the inner city area of Banda Aceh which has remained the same until now. The dark blue circle shows the commercial areas of the city while the light blue circle marks the location of the European and military cluster which has remained intact until now. Furthermore, the green circle marks the Chinese cluster which is also an important urban element of Banda Aceh. The arrival and settlement of Chinese merchants in Banda Aceh before the colonial period has also influenced the articulation of the urban form of Banda Aceh. It is characterized by the rows of shop-houses as the main feature of Chinese architecture. Nas [11] argues that the shop-house models are often found in the China region. Throughout the Aceh Province especially in towns, many rows of shop-houses can still be today, ranging from the old heritage to the new modern style. For example, old shop houses still exist in Peunayong area, Banda Aceh (figure 4) which has been famous as the Chinatown of Banda Aceh. These shop-houses which function as the shops as well as the residences of the Chinese community in Banda Aceh, are located along the main commercial area of the Krueng Aceh River. Meanwhile, the orange circle shown in figure 1 identifies the boundaries of the settlement areas for local Acehnese which is close to the coastal line.

4. Results and Discussion
There are two elements which will be used as the hit or reference for the urban analysis of Banda Aceh: the Grand Mosque (red mark) and the Dalam (yellow mark) (figure 5). These two are the static elements of Banda Aceh which can still be identified from the past to the current time.

![Figure 5. The location and orientation of the Grand Mosque and the Dalam.](image)

4.1. Pre-colonial period (before the 19th century)
There are limited data available for the analysis during this period, especially the appropriate maps. Some of the illustrations available are only the sketches produced by the Portuguese and the Dutch cartographers during the 17th Century.
During the pre-colonial period, Banda Aceh was a busy trading port city where international merchants came for business transactions. The most common map showing Banda Aceh during this period is the map of Banda Aceh in the mid-17th century (figure 6), which was published when Denys Lombard returned to the study of the seventeenth century of Aceh [12]. The location of the Grand Mosque on the river bank of Krueng Aceh is clearly shown in the map, 15 degrees to the west direction facing the kiblat\(^1\), while the Dalam was located near the Mosque facing the river, 15 degrees to the north-south orientation. Another urban element established during this period was the open space (square) in front of the Mosque and the Dalam (light blue mark), and the garden of the Dalam which was called Taman Bustanul-Salatin or Ghairah Park which was located at the back and the left side of the Dalam (green mark).

The Pre-colonial period was the era when the Aceh Kingdom reached its glory. The glory also contributed to the development of the significant architecture of buildings and sites such as Sultanate Palace, Mosque, Fortresses, Royal Mausoleums, and so on. Among the important buildings which have remained intact until the present time are the Gunongan (figure 7) and Pinto Khob (figure 8). Nas [13] quoted: “There are some beautiful examples of pre-colonial architecture, such as the Khob Gate (Pinto Khob) and the Gunongan monument, both of which were part of the royal pleasure gardens and palace”.

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\(^1\) Qiblah (Arabic: قِبْلَة, also transliterated as Kiblah) is an Arabic word for the direction that should be faced when a Muslim prays during Shalat (Wikipedia).
The Gunongan is a man-made miniature mountain made of stone and plaster. The architecture was influenced by Hinduism even though it was built during the period of the Islamic Kingdom of Aceh Darussalam. Next to the Gunongan, there is Kandang Gunongan (figure 9), the grave of Sultan Iskandar Thani built by his wife, the daughter of Iskandar Muda, Sri Ratu Safiatuddin. Meanwhile, the Pintho Khop, also called Pintu Aceh, is the palace gate to the Gunongan complex. It is also known as ‘Pintu Biram Indrabangsa’ which means the symbol of the greatness of the Kings. It functioned as a gate which connected the Sultan Palace. All the buildings (Pintu Khop, Gunongan, and Kandang Gunongan) were built in the early 17th century. It was part of the Bustanul-Salatin, a garden near the Krueng Daroy River which was built by the Sultan to his wife which came from Malay Peninsula.

4.2. Colonial period (1873-1945)

There were two maps analyzed during this period: map of Banda Aceh 1924 (figure 10) and the map of Banda Aceh 1944 (figure 11). The last 20 years of the Dutch colonial rule in Aceh had brought significant changes to the urban form of Banda Aceh. This is clearly seen in these two maps. The Dutch authority developed Banda Aceh into a military city which was supported with new urban elements such as park, school (figure 12), office (figure 13), hospital, religious buildings especially church (figure 14), water tower (figure 15), water storage (figure 16), as well as the military facilities like military ground and telecommunication tower (figure 17), railways, and so on. These buildings were built mostly in the Dutch architectural style [11].
The Dutch also established a military cemetery compound, the Kerkhof Peutjut (figure 18) where they buried their soldiers who died during the battles. Other significant development was the establishment of the European/military settlements in some parts of the city which introduced the new style of architecture, a combination of concrete building style and the vernacular stilt house of the Acehnese (figure 19).

On the 1924 map (figure 10), the Dalam or Keraton was enlarged, and the orientation changed from 15 degrees to the north-south direction into exactly north-south orientation (yellow mark), but it was still facing the main river of Krueng Aceh. The Keraton then was developed into a military base compound supported with military buildings like barracks, offices, and artillery storage. However, the location and the orientation of the Grand Mosque was still the same (red mark). Meanwhile, the size of the square in front of the Keraton was reduced and cut into two parts by the railway (light blue mark). On the other hand, the Dutch established a new open space/square on the Western part of the Keraton, which was called the Esplanade (military ground) and the European Park/Vreede sp ark (light blue mark). This new development took place on the former site of the Palace Garden (green mark).

Furthermore, the new Dutch cemetery compound, the Kerkhof Peutjut (purple mark) was also established on the site of the former Palace Garden or Taman Bustanul-Salatin. Only a small part of the garden at the back side was left due to these expansions. Meanwhile, during this period, the Chinese cluster in Peunayong area, along the riverbank of Krueng Aceh remained on the same location as before the colonial period. It became the center of commercial areas of Banda Aceh. This cluster was identified by the rows of shop-houses adopted from the Chinese architectural style (figure 20).

Furthermore, the map of Banda Aceh 1944 (figure 11), shows great urban development in all directions especially around the boundaries of the inner city. The location and the direction of the Grand Mosque remained the same as the previous period (red mark), and so did the location and the orientation...
of the Keraton. However, 2/3 of the Keraton were changed into military offices and residences (brown mark). While the square in front of the Keraton totally disappeared and was changed into public service buildings like the police station, European club, and railway office, etc. Only a small part of the square in front of the Grand Mosque was left (light blue mark).

On the other hand, the Dutch colonial authorities established a new small square at the back (southern part) of the Keraton (light blue mark). The other elements such as the Esplanade, Kerkhof Peutjut, and the Vreedespark remained intact. However, the Palace Garden became smaller once again as the left part of the garden was also converted into a military cluster (brown mark). Moreover, the Chinese cluster still existed at the same location. Other new development could be seen along the eastern part of the Krueng Aceh river bank (brown mark) which was developed into military clusters and European settlements (dark blue mark). Meanwhile, the commercial areas around the Grand Mosque were also expanded to include new commercial buildings such as hotels and shops.

4.3. Post-colonial period (1945-2004)

The map used for the analysis during the post-colonial period was the map of Banda Aceh 1990 (figure 21), about 45 years after Indonesian independence in 1945. As part of the new development of an independent country, Banda Aceh gradually turned into a new modern city with more facilities, services, and new infrastructures. Roads and bridges were extended and new public buildings like government offices, schools, markets, hospitals, etc. were constructed. The architecture typology of the new constructed buildings was also transformed into a modern style from the previous Dutch colonial style. However, the location and the orientation of the Grand Mosque remained the same (red mark). The only transformation taking place was the size of the Keraton area which was dramatically reduced to a small piece where the Meuligo (Governor’s Official Residence) was located. But the north-south orientation of the Keraton remained unchanged.

![Figure 21. Map of Banda Aceh 1990.](image)

Another transformation was the European cluster on the eastern part of the city which disappeared. It was changed into new modern buildings functioning as both commercial and government offices. Only a small cluster of European residences between the Esplanade and Vreedespark remained intact (dark blue mark). Meanwhile, there were some major changes to the Grand Mosque; the building was expanded and the square in front of the Mosque was enlarged. The other zones such as the Chinese cluster (orange mark), the Dutch cemetery compound (purple mark), the remains of the Palace Garden
(green mark), the *Esplanade* and the *Vreedespark* (light blue mark), and the military zones (brown mark) were still the same.

However, during this period, some Dutch colonial buildings were destroyed due to the development of the inner city. For example, the Aceh Club building or *Societietsgewo te Koeta-Radja* was demolished due to the expansion of the Grand Mosque. Furthermore, the railway service no longer functioned as the main transportation mode of the city. The operation of the railway service built by the Dutch colonial authorities was stopped by the local authority because it was not appropriate to support economic growth/commercial activities since it was built for military purposes [9]. Meanwhile, the art-deco style buildings started to influence the architectural expression of the city in this post-colonial period. The new buildings in the commercial clusters of the inner city were built in this typology style (figure 22).

![Figure 22. New commercial building in the inner city of Banda Aceh. Source: Aceh Heritage Community](image)

### 4.4. Post-tsunami disaster period (2005-2009)

The reconstruction of Banda Aceh city after the tsunami disaster has not greatly contributed to the transformation of the urban layout of the inner city. The zoning of the inner city before the disaster was still the same. The significant transformation of zoning occurred in the settlement areas along the coastal lines in the northern and eastern parts of Banda Aceh which were affected by the tsunami. The settlement areas were moved upwards to the higher land in the western and southern part of the city. The major change of the inner city occurred in the typology of the former *Vreedespark* or *Taman Sari* (figure 23), the European style park which was affected by the tsunami. After the tsunami, the park was rebuilt with modern style architecture. Some new multi-functional buildings were added inside the park. Meanwhile, some military clusters in the inner city especially at the eastern part of the park were converted into government offices.
5. Findings and conclusion
The transformation of the primary urban form and layers of Banda Aceh especially the inner city and its surrounded areas from the past to the present was analyzed using two key urban elements, the Grand Mosque and the Dalam. These two elements were chosen as they survived the past and are still in existence today. Meanwhile, the division of the periods of analysis into four phases (pre-colonial, colonial, post-colonial and post-disaster period) has been able to identify the non-physical aspects of the transformation of ordinary layers of Banda Aceh city. The following table (figure 27) describes the summary of the historical layers transformation of Banda Aceh from pre-colonial to post-disaster period.
In conclusion, there are three main factors that have greatly contributed to the urban transformation of Banda Aceh, namely the past international trading activities, colonialism, and the tsunami disaster. This study contributes to urban design and urban planning disciplines, as it gives a reference on how to understand the complexity of urban problems of the Asian cities, through reading the historical layers and building forms and styles. This reference can be utilized by policy-makers to control and enhance the policies and regulations for the urban development planning, particularly in Asian cities. The regulations that correspond to both physical and non-physical characteristics of Asian cities, including cultural, social, economic, environmental, and political changes.

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