URBANIZATION OF SINGAPORE’S HINTERLANDS

ARCHITECTURE OF THE TERRITORY
RIAU ARCHIPELAGO, INDONESIA
FREE DIPLOMA MYRIAM PERRET

ARCHIPELAGO CITY
BATAM
P7 TERRITORIAL RESEARCH AND DESIGN IN SINGAPORE’S HINTERLANDS

— Free Diploma in Architecture of the Territory
— Urban City Laboratory as Research Content
— Singapore’s Hinterlands

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TERRITORIAL RESEARCH AND DESIGN IN SINGAPORE’S HINTERLANDS
FUTURE CITIES LABORATORY AS RESEARCH CONTEXT

In 2010, the Future City Laboratory (FCL) was started up as the first research program of the Singapore-ETH Centre for Global Environmental Sustainability (SEC), established in collaboration between ETH Zurich (ETHZ) and Singaporean National Research Foundation (NRF). The new laboratory is concerned with the topic of sustainable urban development. FCL’s research focuses on three different scales: sustainable building technologies, the city as an urban system, and the relationship between urban and rural environments. For this purpose, three new professorships have been created. Assistant Professor Milica Topalovic has been mandated to work on the territorial scale.

At first glance, the island city-state of Singapore is the city without a hinterland. Certainly it is the city whose productive territories lie beyond the national borders. The access to resources, land, drinking water, energy and labor has been profoundly important for Singapore since its independence in 1965. On the one hand, these apparent restrictions have proven to foster innovation in urban development, for which Singapore has become known. On the other hand, economic incorporation of proximate areas in Malaysia and Indonesia has remained both a necessity and a profitable investment. The momentous growth found at Singapore’s borders – at the convergence of foreign investment with inexpensive land and labor – is marked by less transparent rules. The politics of control of flows of people and goods has imposed an urban geography of sharp differences.
SINGAPORE STRAITS AND URBANIZATION PROCESS

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**Vessels on the Singapore Straits, 8 km from Singapore Harbor**
Batam's Main Port, Batu Ampar, is along the Singapore Straits, 23 km from Singapore Harbor.
The character of the sea represents the key element for the understanding of the urbanized process in the Singapore region. The Straits of Malacca, leading into the Straits of Singapore is the connection between the Indian and the Pacific Ocean and one of the global maritime trade gateways. The strategic importance of the Singapore region thus persisted through all the power shifts. Gaining rapidly in importance since the independence, Singapore has evolved into the global trade hub in the Straits of Malacca. It now holds the position of the forth most important port worldwide, after Panama, Suez and Shanghai. Each year about 71,500 vessels cross the Straits transporting cargo goods and oil. The intensity of shipping activities in the Straits of Malacca is clearly visible, as hundreds of cargo boats and ferries continue to pass along the horizon.

Population growth Singapore-Batam 1960-2010

SINGAPORE REGION: BORDERS AND CONNECTIONS THROUGHOUT HISTORY

The territory of the Maritime Southeast Asia, or the Malay Archipelago as it is most commonly referred to, comprises Brunei, east Malaysia, Singapore, East Timor, the Philippines and Indonesia. For centuries, the Malay Archipelago has been a unified territory. Through colonial occupation, political borders have been introduced. The first Malay empire, the thalassocratic Srivijaya, embraced the Malay Peninsula, Sumatra and parts of Java and Borneo, and reigned from the 6th to 12th century. Through the appropriation of territorial waters, especially the Straits of Malacca located in the centre of the empire, the Srivijaya built a long and successful history of maritime trade with the Middle East, India, Southeast Asia and China. Srivijaya’s domination of both the Straits of Malacca and the Straits of Sunda gave them control over local trade and the traffic of the maritime Silk Road. In the XV century, the relations with the Arab world brought Islam to the Malay. A power shift took place in around 1400 with the outbreak of the Islamic period, covering the territory of the Malay Peninsula, the Riau islands and parts of Sumatra. The Srivijayan prince and king of Singapura Parameswara was the founder of the new empire, transforming Srivijaya into Malacca. The sultan actively supported the spread of Islam by sending Muslim missionaries throughout the Hindu archipelago. Shortly after, the fall of the Sultanate of Malacca and the Portuguese occupation in 1511 marked a crucial turning point for the area, ushering the period of colonization and parceling of the once unified territory. The religious rivalry prevented a peaceful agreement between the sultanate and the Portuguese. Shortly after the occupation, a new sultanae was founded in Johor, side-by-side with the Portuguese Malacca, with the increasing European colonization of Southeast Asia, the Malay territory was becoming increasingly fragmented. Through the Anglo-Dutch Treaty of 1824, the British and the Dutch dominions were established in the north and south. In this manner, the once unified region was irrevocably fragmented, following the lines drawn by the British in 1819. The independence of Indonesia in 1945, Malaysia in 1957 and Singapore in 1963, could not renew the weakened political ties between each geopolitical entities into a fragmented territory surrounding Singapore today represents a complex and paradoxical context marked by cultural unity, the need for economic alliance, and political rivalry.
POLITICAL AND ECONOMIC DEVELOPMENT PERIOD

1945 A.D.
17 August: The declaration of independence of Indonesia by Soekarno Hatta after 8 years of Japanese occupation from the Axis

1948-1950 A.D.
Political and territorial integrity was called a line of redrawing national and state boundaries

1950-1956 A.D.
Old Order
- Dutch colonialism
- Economic and political control by foreign powers

1956-1966 A.D.
New Order
- Economic development and stabilisation
- Independence from the foreign powers

1966-1968
- Suharto takes power
- Beginning of the New Order

1968-1988
- President Suharto
- Indonesia under the New Order

1998-2004 A.D.
- President Soeharto
- Political crisis

2001-2014 A.D.
- President Megawati
- Indonesia in the 21st century

- Reformasi
- New political order

- Economic growth

- Democratic elections

- External challenges

- Economic growth
- Political stability

- Economic instability

- Political instability

- Economic growth

- Political instability

- Economic growth

- Political instability

- Economic growth

- Political instability
HOW TO DESCRIBE AND DESIGN THE DEVELOPMENT OF HINTERLAND TERRITORIES?

The industrial and urban development of the Indonesian Batam island is strongly related to its strategic position along the Straits of Singapore and its proximity to the booming city-state. The analysis of the Batam Free Trade Zone in this project describes the character of the economic relation between Singapore and its productive hinterland. The characteristics of the hinterland urban development process and the emerging urban forms of the Batam island have been studied in detail. In addition, the potential of the Riau Archipelago has been described with the particular focus on topography, natural characteristics and the traditional ways of organizing this Indonesian territory. We will see how rather local values nor the connections within the wider metropolitan region of Singapore have been integrated into the development process of the archipelago so far. In order to propose a new development strategy, those qualities that set the Riau Archipelago apart from Singapore and the Johor peninsula will be used in order to create a site-specific urban vision, and increase its value as autonomous city.
SINGAPORE REGION: FRAGMENTED POLITICAL TERRITORY

The political border fragments the united territory along the Singapore Straits. Between Malaysia, Singapore and Indonesia, there are strict border controls, leading to restricted mobility for large parts of the population, especially the Indonesians. Singapore practices a strong migration control that even excludes the workers of Singaporean factories, lying on the southern side of the Straits.

SINGAPORE REGION: CONNECTED PRODUCTIVE TERRITORY

Through Singapore’s economic growth, expansion of its production to the neighboring countries became necessary. The implementation of various political solutions favoring open trade relations, such as the so-called Growth Triangle in 1969, have achieved a degree of economic unification in the politically fragmented region. The Free Trade Zones established in Johor and the Riau Province, now clearly serve the city-state of Singapore, both in terms of location and economic hierarchy.

THE STATE OF ADEPENDENCY

The industrialization in the Free Trade Zones are clearly linked to Singapore. Many of the industrial infrastructures and facilities founded on Batam, such as ports and shipyards, hold complementary functions to the port of Singapore. Furthermore, the goods produced in Batam are shipped to Singapore, where they are assembled. This process allows companies to market the goods as being Made in Singapore, which brings an added value on the international market. It appears that external economic forces, linked with the ‘maritime highway’ previously discussed, represent primary forces of urbanization process in the Riau Islands. A significant portion of this economy is driven by Singapore, where

Investment in million US$ in Batam 2009

much of the investment behind the industries of Batam Island comes from. In fact, the majority of businesses in Batam are Singapore-owned.

Number of Foreign Companies by Country

- Singapore 401
- Malaysia 45
- Taiwan 23
- Korea 19
- Japan 15
- Australia 15
- China 14
- USA 12
- India 9
- England 4

FREE TRADE ZONE AS TERRITORIAL FORM

Owing to its strategic location, Batam economy evolved rapidly, and through several stages. Legislative definitions and boundaries for production were adjusted several times, before Batam become the Free Trade Zone that it is today. Four important stages of economic development can be identified: the modernization of agriculture (including mining activities in the 1960s), industrialization based on import substitution in the 1970s, oil-based development in the 1980s and export-led industrialization (which began in the 1990s) and now remains the most important economic sector in Batam. Within the Free Trade Zone of Batam, foreign companies receive following advantages and incentives to produce: exemption on import and export tax, exemption on value added tax, generalized system of preferential facilities, double taxation avoidance agreement with fifty seven (57) countries and competitive investment and operation cost. Among the outcomes of the rapid development under the conditions of the Free Trade Zone, a form of urban planning that prioritizes those land uses that encourage economic growth. The numerous industrial sites, resulting from the process, could be described as generic spaces, which are not integrated in the urban structure. Their only aim is to serve a productive function without articulating a specific space.

THE TRIANGLE OF GROWTH

Given the major geo-political importance of the three nations along the Straits of Malacca, Singapore, Indonesia and Malaysia have opted to strengthen their economic ties. In 1969, the Deputy Prime
Minister of Singapore, Oth Chok Tong, formulated the initial transnational economic cooperation and management through the Triangle of Growth, or SIORJ; the acronym for Singapore, Johor, and Riau provinces. Following Singapore's involvement became apparent, inclusion has significantly expanded, to now include further areas of Indonesia and Malaysia, such as Kit Si Phum, Malacca, Negri Samulun, and Pahang. The agreement enables the transfer of finance, knowledge, control and management systems of Singapore in exchange for labor, land and other natural resources of the adjacent territories as strategic industrial transfers, special economic zones (or free trade zones) were defined in Malaysia and Indonesia, known as Free Trade Zones (FTZ). In 2007 Batam, Bintan and Karimun Free Port and Trade Zone were established. The common goal for this cooperation is to strengthen the region's competitive position in Southeast Asia by attracting inward investment. The benefits of the integration for all sides notwithstanding, the disparity in political and economic power in the region poses serious challenges for its development.

HABIBI, FATHER OF BATAM

At first, the proximity and the visibility of the booming Singapore threatened former President Sukharto (Indonesia's second president, in power from 1967 to 1998), as it represented a danger for the independence of Indonesia. Thus he was initially concerned with installing military bases in the region, a ploy to transform Batam into the economic leader of the nation began with President Suharto in 1998. In 1998, Habibi became the president of Indonesia for a short-term replacing Mr. Suharto, who resigned his presidency after 32 years. Even though Habibi's regency lasted only one year, his impact on Indonesia's economy was significant. He is admired as being "the father of modern Batam". Habibi's vision was to transform Batam "Jungle where there was nothing" into the twin city of Singapore, by taking advantage of a mutual beneficial collaboration between Singapore and the Riau Archipelago. In order to offer an attractive environment for Singapore's investment, Habibi invested mainly in infrastructural implementations. Since 1993, Batam's industrial and the corresponding urban growth has been managed by the central administrative body named BIDA, the Batam Industrial Development Authority, with the goal of improving the international-economic competitiveness of the island. Streets and bridges, connecting to the islands, have been built while Habibi was the chairman in BIDA. Those infrastructural changes on the island represented the base of the economic development on Batam.
Chronology of Important Regulations for Batam Development and changes in Governmental status

1970 Presidential Decree No.38
Batam designated as a logistics base of offshore drilling operations (exploration and exploitation) of PERAMUS (National Oil Company).

1971 Presidential Decree No.34
Instead of logistic base, Batam was designated as an industrial area and entrepot center, simultaneously established BIDs (Bintan Island Development Authority) and PT Permanen Batam (Bonded Warehouse Authority).

1973 Presidential Decree No.41
The determination of the entire Batam Island as an industrial area, the establishment of BIDA (Bintan Island Development Authority) and PT Permanen Batam (Bonded Warehouse Authority).

1974 Presidential Decree No.41
The determination of the entire Batam Island as a bonded zone (Special Economic Zone).

1975 Presidential Decree No.45
Batam Island treated as a trans-shipment point and BIDA delegated rights in economic activities for the industrialization of Batam.

1976 Presidential Decree No.33
Batam status changed from a sub-district of Balingkang Padang to a municipality of Batam.

1976 Presidential Decree No.41
Relationship between municipal government and Batam Industrial Development Authority.

1978 Presidential Decree No.45
Spatial expansion of Batam's industrialization and BIDA's authoritative regions including the islands of Janda Baik, Tanjung Barat, Keningau, and Mol. Mol.

1983 Government Regulation No.34
Further spatial expansion of Batam industrial working area and its status as a bonded zone to the island groups of Tanjung Olung.

1984 Presidential Decree No.7
The improvement to the Presidential Decree No.41 11773 concerning Batam Industrial Development Authority.

1985 Government Regulation No.56
The change of status of Batam as an autonomous city with new boundaries.

1992 Presidential Decree No.28
The initialisation of BIDA.

1995 Presidential Decree No.84
Regulates the direction of the development including the division of authority between the city Government and BIDA.

1999 Law No.53
The designation of the island of Batam from a bonded zone to a Special Trade Area.

2000 Government Regulation
Together with the Regency of Kepulauan Riau, Karimun, Natuna and the city of Tanjungpinang, Batam is under the territorial Authority of the new Province of Kepulauan Riau.
INFRASTRUCTURE AS CATALYST OF PRODUCTION

In the Singapore region three main types of infrastructure need to be considered. First of all there is the sea. On one hand it connects the region on a global scale, through the Singapore Straits and on the other hand it joins Singapore, Malaysia and the Riau Archipelago on a regional level. Both exchange of goods and persons are facilitated by the maritime infrastructure. The sea is highly activated, being a connecting surface rather than a separating border. The “maritime highway” is the primary attractor of industrialisation in the region.

The ports are the interface between the desiring sea and the serving land. Ferries leave the pier of each of the six passenger

ports in Batam on an hourly basis; 59.62% of visitors to Batam are Singaporeans. Cargo ports have a major role in the region, as all the produced goods are transported from the industries by sea. The interior transfer of goods is by road, well developed along the strategic axes linking up with cargo ports. By contrast, the streets of the inhabited areas are rarely paved. This fact further supports the thesis that the current development logic and priorities are strongly based on favour of industrial production. The public transports on the island consist in a semi-official bus service.

The accessibility of the coastal areas is low, they are mainly reserved to private uses and infrastructure, the industrial sites, ports, exclusive tourist resorts and high-end housing.
GENDER RELATED TYPES OF PRODUCTION

Since 1971, when Batam was first designated as industrial zone, its economy based on industry has been steadily growing. Working force was needed and provided by promoting new economic possibilities through factory work in different parts of Indonesia. The production of electronic devices is the leading sector of Batam's industry. The demand for female workers in the industrial parks is high as women are considered the most skilled for precise and repetitive work. This is particularly important for work in the electronic factories, which demand high levels of concentration and fine motor skills. Many of the women lose their post when they pass the age of 25, as maximal efficiency is expected. The more physically demanding work in shipyard industries is mostly allocated to men. The impact of the industry on the population is clearly readable in the demographic age distribution. The number of female between 20 and 25 is surprisingly high due to the gender and age-specific types of production.

UNEVEN DISTRIBUTION OF THE ECONOMIC BENEFIT

The possibility for economic growth of Batam was definitely related to its offer of cheap labour. The minimum wage in 1995 was set on 220,000 Rp, corresponding to 22 CH Fr. per month. This low income led to critical living conditions, culminating in the expansion of informal settlements and consequently to several riots erupting as an attempt to change existing circumstances. Until 2010, the minimum wage grew up to 1,110,000 Rp. per month. Even if this represents five-fold increase in salary, the rising costs of living, affected by Batam's proximity to Singapore, have to be considered, too. Few inhabitants of Batam can afford the imported goods. Especially the indigenous populations of the islands find themselves excluded from the new development processes. Referring to the statistics of the development of the economic sectors, it is visible that the importance of trade is growing. The industry is slowly and gradually losing in importance, which remains the principle player in Batam's economy. Arguably, this indicates a long-term process in which Batam's economy will shift away from the manufacturing sector to toward the service sector. This potential turn would increase the welfare of its population, too.

Work Force Based on Business Sectors

<table>
<thead>
<tr>
<th>Industry</th>
<th>Female 1990</th>
<th>Male 1990</th>
<th>Female 2000</th>
<th>Male 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity, Gas, Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery/electrical</td>
<td>32%</td>
<td></td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Boilers, mech. appl</td>
<td>23%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ships</td>
<td>11%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objects of iron and steel</td>
<td>10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical devices</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil and gas animal/vegetable</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical products</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knitted goods</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exported goods per categories 2006

Productive Territory
Type 1: Shipyard Industry

The fifty-eight (58) shipyard sites of Belem occupy and transform long stretches of the coastal land. They are used for repairing and constructing vessels for international companies. Dry Docks, from the United Arab Emirates is the largest company in ship production on the island. The industrialized water fronts are privatized and inaccessible to the public. The Shipyard industries are built on large stretches of land cleared from vegetation or on artificially reclaimed land. Huge masses of land are displaced in order to gain direct access to the deep waters. Consequently, areas that once hosted mangrove forests have been transformed in a violent and irreversible manner.
TYPILOGY OF INDUSTRIAL PARKS

TYPE 2: INDUSTRIAL PARK

Twenty seven (27) industrial parks are located on Batam Island. Their infrastructure is well developed in order to attract foreign investment. Batamindo industrial park for example, has its own energy and water supply, as well as a commercial area, on site. The availability of these infrastructures, together with the lack of affordable housing in Batam led to an extensive development of informal housing areas and informal manufacturing, often in direct proximity of the industrial parks. In Batamindo and other large parks, dormitories are offered as a housing option for the workers. As the majority of the workforce in the electronic firms consists of unmarried young women, dormitories are seen as a convenient housing solution for clean and safe living. On the other hand, numerous restrictions limit the freedom of the inhabitants, and dictate a particular lifestyle on the premises of the industrial parks; for example, only singles are allowed to live there.
TYPE 3: TOURIST RESORTS

Mainly located along or in the proximity to the coast, the tourist resorts have only a small impact on Batam Island. On one hand, Batam's tourism is predominantly related to business, thus Batam city features many centrally located hotel for short term stay. On the other hand, Batam also has the reputation as the 'men’s paradise', attracting male Singaporeans over weekends. Even though Batam has the third-largest amount of visitors in Indonesia (after Bali and Jakarta), the lengths of stays are generally limited to two to three days. The neighbouring island of Bintan and its tourist sector have a more favourable perception in Singapore. In effect Batam and Bintan, both municipalities of the Riau province, are competing instead of sustaining each others' economic activity. The tourism related to golfing occupies larger areas, having greater impact on the islands than the beach resort. For example, the stagnant waters used as an aesthetic element and a barrier in golf courses, often facilitate the propagation of mosquitos carrying of the malaria and dengue fever.

Singapore: 59.62%
Others: 37.73%
Malaysian: 12.81%
Korean: 4.46%
Indian: 2.45%
Japanese: 2.39%
Chinese: 1.68%
English: 1.18%
Large tracts of land are cleared of vegetation and hills are cut in order to prepare the sites for development. The resulting empty land, stays in latent condition for years, prepared for future development. The altered red-earth landscapes dominate the perception of Batam island. The fertile tropical land seems transformed into a bleached desert that often remains unused for years.
PRODUCTION AREAS OUTSIDE BATAM FREE TRADE ZONE

In the archipelago, many economic activities take place independently from the Free Trade Zone, and remain uncharted or even illegal. It appears for example that smuggling was for a long time a remunerative business in the Riau Archipelago. Traditional economies such as fishing and agriculture can now also be considered as unregulated. On strategically located islands, especially those near to the Straits, special services for shipping such as fuel terminals are offered. As a consequence of these observations, a hypothesis can be made that the Free Trade Zone is not present a static border to production in the area of Batam.

TYPE 6: FISHERY

Fishing remains central to the livelihood of the indigenous inhabitants of the archipelago. The fishing activities can be classified into three types: the tribal, the modern and the commercial. The mobile and seasonal tribal fishing takes place mainly along the coast and serves as self-subsistence of the indigenous population. The fish supply of the main island of Batam is guaranteed by the modern fishing. The Dutch implemented a

TYPE 5: AGRICULTURE

The tropical climate allows cultivation of various fruits and vegetables in the Riau Archipelago. While most of the agricultural activities on Batam, respectively on Galang and Rempang, are practiced on land that has been occupied illegally, the outputs are certainly vital to the regional population. But Batam is also active in large-scale production in the sector of agriculture. On Pulau Bulan for example, pig, crocodiles and orchids are produced especially for Singapore with as many as 1500 pigs being shipped daily from Bulan to Singapore.
law that assigned all the coastal areas of Batam within 3 miles to the indigenous population. This reglementation has, of course been neglected by the land and water use by the industrial activities within the Free Trade Zone. Singaporean fish traders, who buy the fish directly on the sea, largely control the commercial fishing prices. The fish and other sea creatures, bought from Malay fishermen can be sold for up to five times the price in Singapore. The fishing boats are a constant visual element in the archipelago, offering a picturesque image of the once traditional lifestyle. The romantic image obscures the unfavourable position of indigenous population in regional economy.

Indonesia and the Riau Archipelago are known for the resources of oil, gas, bauxite, tin, price, metals, coal, peat, rubber palm oil and logs, which are increasingly exploited for export and domestic use. Long pipelines leading from Sumatra and other parts of Indonesia across Batam and the Straits, supply Singapore with gas. The pipeline crosses Batam Island and three other islands of Batam municipality, with great security measures applied. The counter of the gas flow from Indonesia to Singapore is located on Peniing Island. The economic activities in Batam started with offshore oil exploitation by the company Pertamina. The state-owned company built an oil and gas storage and fuel terminal on Sambu, one of the islands closest to the Straits.
The productive territories of Batam are in a strong dependence on Singapore. The industry is strongly related to terrestrial and maritime infrastructure, especially the Singapore Straits. Thus there exists a strong relation between industry and coastline, as the sea surface is part of the maritime infrastructure.

The industry is oriented toward the Singapore Straits in order to maintain the proximity and rationalize the transportation efforts.

Industrial sites attract the development of informal housing due to different reasons such as highly developed infrastructure, proximity to the workplace, possibility of small manufacturing or other business.

The Free trade zone seems not to be a limit for production in the Batam region.
SINGAPORE REGION: A TRI-NATIONAL METROPOLIS?

As a consequence to the industrialization process, a rapid population growth took place in the Singapore Region, and the city-state expanded its economy to the neighbouring lands forming a trilateral metropolitan region. In contrast to the economic flows, the flows of people within the metropolitan region are more strictly regulated and restricted. While the existing infrastructural connections between Malaysia, Singapore and Indonesia allow for high-paced commuter traffic, the borders function as semi-permeable apparatuses, where Singaporeans seem to hold the power to control the cross-border mobility and exchange.

URBAN GROWTH DUE TO NATIONAL MIGRATION

The rising economy on Batam led to an increasing demand for cheap labour on the island. The work opportunities have attracted people from different parts of Indonesia. Many inhabitants of Sumatra and Java come to Batam in the hope of a better life, and with the intention of supporting their families back home. Most migrant workers come from poor rural areas, and often have a preference for rural way of life. Arriving to Batam, they are confronted with a different reality. The unexpectedly high living costs complicate the realisation of their plans and of supporting their families. The migration led to a rapid urbanization of Batam, which has been difficult to plan. The government is concerned about the lack of working places and opportunities, and the rising unemployment in recent years, combined with the constant population increase.

Sebastian works as an IT Engineer at Dry Dock World. He worked in the same company over 11 years and is planning to stay in Batam. Age: 42 years. Origin: North Sumatra Medan


LOW-DENSITY URBANIZATION

The rapid population growth led to a largely uncontrolled urbanization process. Its spatial consequences are manifested in the inefficient land use. Batam is built up in a continuous low rise and low-density pattern that is perceived as a homogeneous urban carpet. Certainly, the challenge of managing and planning a city that has been characterized by a population growth of 30.00% over 30 years has been enormous. At the same time, the government’s planning policies clearly focused on the economic development, neglecting the social needs and public interests in the process. Consequently, large areas of low-density housing, informal and formal, as well as latent land, dominate the urban landscape of the island. Spatial differentiation and efficient land use have not yet been achieved.
The vector of the current urban growth is pointing inland, and the new extensions are detached both from the sea and the coastline. As we observed in the previous chapter, the industrial sites are irregularly related to the sea and the shore, due to their need for water access and their relations to Singapore. Thus, the detachment of the urban centres from the sea and the coastline could be interpreted as a form of spatial segregation formed through the opposition of local and foreign interests on the island. While goods are meant to cross the borders in both directions, passengers are subject to more complex restrictions. Further, the importance of thorough roads is visible in the urban layout, as the dense urban patterns concentrate along the main traffic axes. The roads cross the island, but the coast is mainly accessible for private uses, predominantly industries. The dead-end roads that reach the coastline have not been connected so far. A further indicator for a weak social connection between Singapore and Batam is the weak relations between the city centres and the ports. Even though the passenger ports are highly developed, they are detached from the urban fabric, and their surrounding areas remain unused.
Housing development on Batam not only follows the process of industrialization, it actually has a subordinate position in the emerging urban hierarchy. As the planning authorities have always been emphasizing economic growth and therefore reserving strategic locations for industrial development, cities have evolved in the "backyards" of industries, in the leftover space, as it were.
TOPOGRAPHY AS NATURAL BORDER OF URBAN GROWTH

The topography draws a limit to urbanization. The majority of the built structures have developed between 2 and 10 meters above sea level. Exceptionally, informal settlements are located higher, up to 45 meters.
Nature protection areas have been created at higher topographic elevations. Those zones are gated and thus inaccessible to the public. At the same time they form a border for urban development. Informal settlements present an exception, and can be found in the nature protection areas too, where small-scale agriculture can be practiced.
HOUSING TYPES

The main issue concerning housing on Batam is certainly the lack of affordable housing. Numerous informal settlements are spread throughout the island. The government has recognized the problem and has been searching for alternatives, such as the KSB and the RU/SUN housing models. However, no stable solution to this issue has emerged yet. The developer housing types on Batam remind of developer architecture anywhere in the world, rather than offering architecture responsive to local conditions. No site-specific or climate adapted housing proposals exists in the region, except for the vernacular villages, the Kampungs.
mosques and schools that often complement the neighbouring urban or industrial areas.

Rumah liar, meaning ‘wild houses’ is the Indonesian expression for informal housing. They develop mostly near to infrastructures, as they do not have access to services such as clean water, electricity and sewage systems. These simple constructions offer shelter to nearly 20% of Batam’s population. The social structures in informal settlements seem to be highly developed, and based on ethnic and familial relations. Informal villages offer a mix of urban programs, such as small manufacture.

electricity. By contrast, the sewage and waste management are usually not provided. The location of the KSB settlements on Batam is peripheral, far from the workplaces and on the edges of the urban area.

KSB (Kavling Siap Bangun) means “lot ready to build”. In this type of housing development, also known as the “site and services”, the government usually provides the lots while the construction lies in the hands of the inhabitants. The government also provides basic infrastructures and paved access roads. Costs for buildings in KSB villages can vary greatly. However, even the low-cost KSB houses are much more expensive than their counterparts in illegal settlements. The plots are set out in a grid, for rational distribution of water and
The neighbourhoods of the developers' housing remind of gated communities, although the entrance is usually not guarded, but serves a more symbolic purpose. Within the compounds, the row houses, single-family houses, and occasionally shop houses, are usually surrounded by gardens and are accessible by car. Houses belong mostly in the middle to upper social segment, and can vary greatly in quality and size. It appears also that this type of housing reveals a gap between the supply and the demand on Batam island. Several housing projects have been abandoned during construction, as no buyers could be found.

The so-called "rukos" are mostly found in open urban areas, but sporadically in combination with other housing types. They are always well connected to the main roads, and are built by investors. They usually host shops in the first floor and dwellings second and third floors, and usually form commercial streets in their respective neighbourhoods. Water, electricity, sewage and waste disposal facilities are well developed in the shop-house areas.
TYPE 5: TRADITIONAL HOUSING

A reversed picture is offered in analysing the traditional villages. The traditional Malay constructions, the so-called "Kampung" (the old village) are scattered all over the Riau Archipelago. The indigenous Malay or the so-called "Orang Laut", (the people of the sea) are fishermen, and engage in small-scale agriculture. Their settlements are always located at the interface between the sea and the land, with stilt houses standing on the coast in shallow water. Three types of indigenous settlements or dwellings can be differentiated: the nomadic canoes dwelling, the semi-mobile sea dwelling, and the permanent model of housing on the coast. Even if their constructions are slightly different, they are all oriented toward the sea and strongly connected with its resources. The movement and all forms of exchange among the inhabitants happen on the water. With their architecture and the entire way of life, the indigenous Malays have adapted to the specific balance between the sea and the land. The tribal Malays, the "Sulu Laut", (the sea people) or more commonly known as the sea gilies, usually move amongst the unpopulated islands of the archipelago. Entire families share a canoe as their home. Their trajectories are related to the seasonal winds, that influencing the sea currents and the fish stocks. The Sulu Laut are the poorest and the most disrespected group among the indigenous inhabitants. Perhaps this is why they exhibit a strong ethnic identity, offering mutual assistance among their own kinship members and maintaining their cultural boundaries. Governmental attempts to settle the nomadic tribes have all failed. The "Rumah-Rumah Terapung" are sea-based houses built like a pontoon with four strong and adjustable chains hooked on the seabed. These houses have the ability to float on the water, moving on the sea surface and following the movement of the tides. Floating houses that can serve as fishing boats are also built. They can move individually or assemble with others on the coast.
The most defused and therefore the most common indigenous settlements, the “Kampungs” are located on the coast. The vernacular stilts constructions, start from the coastline and extend far into the water. The water topography becomes the limit to the expansion of these settlements. The houses are mainly accessible by water, which represents the main infrastructure for these settlements. The Kampungs often feature a main port, located on the very edge between the shallow and the deep waters. Thus even larger boats can exchange their goods and passengers. The shallow waters further give the opportunity for fishing, while the movement of the tides cleans the shore.

Although the social and economic structure of Kampungs presents a system in itself, the connections existing among the islands are even more relevant. The archipelago works as a network of specific functions and identities. Different islands trade with each other, different levels of
The Rau Archipelago is marked by a certain duality. Nature and indigenous ways of life stand in contrast to the expanding industrial and commercial landscapes. The indigenous Malay population forms the majority on the 3,200 islands of the Rau Province, even if immigrants now predominate on the island of Batam. The urbanization of Rau Islands has so far excluded the agricultural sector, and thus the traditional economy of the indigenous population. The work opportunities in the free trade zones have been inaccessible for the indigenous Malay, and their small commerce has been marginalized. Since the creation of the bounded zone on Batam in 1978, the gap between the industrializing area and the traditional areas grew. While the trade activities within the bounded zone are largely legal and subject to taxation, beyond the bounded zone they are usually informal.

Several indigenous settlements have been displaced or even destroyed by the development pressure. But some of the kampung tua became integrated into the urbanised area of Batam Island, and have even expanded inland, away from the coastline. A mix of the traditional and the informal housing emerged.
THESIS NO. 2

The rapid population growth due to national migration led to uncontrolled, unbalanced, and inefficient land use. The cities develop detached from the coastline and maritime infrastructure. Current housing developments are located in the back of industry.

The topography is a natural limit to urban growth on Batam Island. Nature protection areas are political limits to urban development. The traditional housing is always oriented toward the sea. An inverted logic is observable between the current and the traditional logic of settlements. In the traditional way of inhabiting the territory, the sea topography becomes the border of growth. The traditional settlements form an interlinked network across the archipelago.
Typical Vegetation: Mangroves
The Riau Archipelago can be recognized as a specific and unique territory whose topography, and natural, cultural qualities set it apart from Singapore and the Johor peninsula, where natural areas are entirely urbanized and operate as strategically located voids. In the archipelago, the sea surface mediates between the different islands. In the local context of the Riau, the movement and exchange of goods and people among the islands is dynamic, both legal and illegal. The sea gives individual identities and specific roles for different islands, while at the same time linking them together in a network.

ARCHIPELAGO AS TERRITORIAL FORM

At first glance, the Riau Archipelago is a picturesque island landscape where few villages scattered along the coastline seem to leave just a weak trace in the natural setting. This archipelago is also a social space, where indigenous cultures used to develop along the edges between the land and the sea. But most interestingly for this project, the Riau Archipelago can be recognized as a specific and unique territory whose topography, and natural and cultural qualities set it apart from Singapore and the Johor peninsula. Until now, these potentials have not been engaged in the area’s planning and development.
The tropical landscape has experienced an enormous transformation, following the onset of industrialization and the urbanization processes in the early 1990s. In the north of the island, the landscape has been transformed completely, while it is still preserved in the southern part of the archipelago. The shallower waters located further away from the straits, serve as a sort of a buffer to urbanization.

NATURAL AND CULTURAL RESOURCES OF THE ARCHipelago

It is not difficult to see and describe the Riau Archipelago as a paradoxical landscape. There are more than three thousand islands in the archipelago, most of them covered by mangrove forests and palm trees. Many exotic fruits, including coconut, dragon fruit, and papaya are cultivated here. The wealth of the sea is precious, too. Fish, crab, and mussels have formed the daily alimentation of the local population, and are increasingly used for export. Coral reefs of the Riau Archipelago are already becoming an element of attraction for tourism. The ecosystem relating mangrove forested coasts with maritime habitat is of vital importance for the area.
The status of Batam City as a Free Trade Zone has increased its pace of development. In order to enlarge the land surface, the technique of cutting hills, dredging and underwater mining is used. Several other maritime countries such as Singapore, Hong Kong and Japan use this radical procedure, too. The reclamation of land has an alarming impact; it destabilizes the land morphology, causing landslides, and it affects the balance of the ecosystems. On land, cutting of hills for backfill material leads to severe erosion and sedimentation causes flooding and deterioration of the water quality. The tidal waves hit the shore harder, without shock absorbing mechanism of the natural sea floor. This leads to more intensive abrasion and eventual destabilization of the coastal areas. The reclaimed areas have destroyed countless hectares of mangroves, forest and coral reefs. The fish stock has diminished, causing a reduction of 75% of fish catches in the areas where land reclamation occurred. The land reclamation has undesirable effects on topographic, environmental and social environment. Alternative solutions regarding the land use need to be explored.
Reserved Areas

Batam has installed six reservoirs in order to guarantee the fresh water supply on the island. The areas surrounding these water tanks are designated as nature protection areas, protecting the entire watersheds from construction and pollution. Damming estuaries, a procedure that has been used on all rivers in Singapore, creates the reservoirs. The Durangbang reservoir is by far the largest water tank in Batam Island with a capacity of 3,000 liters per second. Even if large housing areas are not yet connected to the water pipeline system, the supply can be guaranteed as trucks are now transporting and selling water to the different neighbourhoods. Reninging to indications of the BIFZA, Batam is expecting to have a shortage of freshwater in the near future. Plans of importing water from Bintan are being considered. As we know, the water supply in Singapore is deeply dependent on its neighbouring countries. As water is the primary condition for urban development, its importance and value as a commodity will gain enormously in a near future. Furthermore, the area around the airport is reserved as infrastructural surface.
MANGROVE FORESTS

Mangrove forests are part of the Indonesian law No.41 of forestry. This legislation dictates that 1/3 of all the Indonesian islands needs to be forested and at least 10% of the coastal areas have to remain vegetated with mangroves. Due to the rapid industrial and urban growth on Batam, the mangrove forest decreased of almost 32% in six years. The rich ecosystem remains endangered because of the major development pressure on its coastal areas.

Evolution of Mangrove’s Forest in Ha 2001-2007

<table>
<thead>
<tr>
<th>Total Area (ha)</th>
<th>2001</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low density</td>
<td>1000</td>
<td>750</td>
</tr>
<tr>
<td>Medium-density</td>
<td>1500</td>
<td>1200</td>
</tr>
<tr>
<td>High density</td>
<td>2000</td>
<td>1500</td>
</tr>
</tbody>
</table>

Due to the specific topography of the Riau Archipelago, mangroves form the most prominent forested areas in the region. The capacity of living in a saline environment locates the mangroves on the shore and in brackish waters along estuaries. Mangroves have several physical functions such as maintaining the stability of the coastline, protecting the coastal area from abrasion and intrusion and processing the waist. Their biological functions consist in nursery and spawning grounds for fishes, shrimps and other water organisms, nesting ground for birds and natural habitat for many kinds of birds. Mangroves can even be seen as economic potential. They can be used as firewood, salt processing instruments, embankment and building material.
The spatial condition of the archipelago sets Riau Islands apart from Johor and Singapore, and therefore offers a specific potential. The territory is violently transformed by means of cutting hills, dredging and underwater mining.

The capacity of the reservoirs represents a limit for the urban growth. As water is the primary condition for urban development, its importance as a valuable resource will gain enormously on value in a near future.

Estuaries and coastal areas are hosting the precious natural resources of mangroves, which stands under pressure due to the rapid urban development.

The specific topography of the territory with its tides and shallow waters, is offering a typical environment for mangroves. The mangroves are internationally considered as essential plant for the balance of our ecosystem and could be used for economic gains.
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The Urbanized and the Quiet Sea
THE DUALITY OF THE TERRITORY

In the closer analysis of the territory of the Singapore Straits the duality of sea and land can be observed. Toward the Straits, a strong industrialization and urbanization process is taking place. The areas of the free trade zones are the ones primarily affected by these transformations, while in the southern parts of the Riau Archipelago natural and qualities and traditional settlements seem to be largely preserved. Consequently, the project focuses on the duality of an urbanized and a quiet sea.

URBAN TRANSFORMATION: HINTERLAND VS. ARCHIPELAGO

Throughout the analysis the duality of the territory can be observed on the Batam Island too. The urbanization forces caused by the Singapore Straits affect primarily the northern part of the Batam municipality. While the industrialization of the area is largely contained within the Free Trade Zones, the potentials of the Archipelago have so far been neglected. The quality and the importance of large quiet and natural areas lying in background of the growing towns, seems to be underestimated.
GUIDELINES FOR THE NEW URBANIZATION STRATEGY

In order to avoid unaided planning, focusing exclusively on economic growth at the cost of local livelihood, a balance between the economic and social components of urbanization needs to be created in Batam. We hypothesize that the development of independent urbanization strategies could strengthen the political, economical and social capacity of the region. Therefore guidelines concerning the city development, infrastructure, industry and the quiet territories are put forward in this chapter.

THE ARCHIPELAGO CITY ALONG THE SINGAPORE STRAITS

Thus Archipelago City maintains the proximity to the Singapore Straits the primary engine of the urban development in the area. Considering that Batam has five times the length of Singapore's coastline, and about 500 times the number of islands, the main potential of the Batams Municipality, and more broadly the Riau Province, can be found in the unique topography. The natural condition of the archipelago sets Riau apart from the Malaysian Peninsula and from the island form of Singapore. The vision for the new Archipelago City emphasises the site-specific qualities and experiences of traditional settlements and ways of life in order to arrive at independent and sustainable concepts for future developments.
INTRODUCTION OF THE INDUSTRY IN THE URBAN STRUCTURE

As observed, the industrial parks are usually detached from the urban structure and the urban centres. The integration of industrial parks into the urban structures would be beneficial; the housing could develop in proximity to the working places and commuting distances could be reduced. Furthermore, the existing commercial and public facilities of the parks and their strong infrastructures could benefit the surrounding urban neighbourhoods too. In the long term, together with the gradual transformation of Batam's economy toward the service sector, a transformation scenario for industrial parks can be foreseen; the parks can become new public, office, and commercial areas, and the large industrial buildings can be converted for new uses.

EXTENSION OF URBAN CENTERS TOWARDS THE COASTLINE

At present, surprisingly, the highly developed passenger ports on Batam stand completely detached from urban structures and urban centres on the island. Thus, the proposal is to integrate them into the urban structure, by using them as focal points for the development of new urban centres. If this coastal infrastructure was used for the future development of Batam City, the exchange and the correlation among the different islands, even an urbanistic relationship to the Straits and to Singapore, could be achieved. Consequently, the region could function as a unified network of different urban entities instead of a collection of strongly separated centres.

INHABITING SMALL ISLANDS:

"THE NEW KAMPUNG" LIVING

Considering the detrimental effects of the large-scale land reclamation campaigns on Batam, we propose that this procedure should be limited only to industrial purposes, and should not be used in new housing developments. The traditional way of inhabiting the area discloses an alternative of coastal living, namely the construction on the water. Consequently, the Archipelago City would include new neighbourhoods built on the islands facing the Singapore Straits. In reinterpreting the traditional Kampungs and taking advantage of the shallow waters, more site-specific settlements could be developed and land surface could be won.
The archipelago infrastructure.

The balance between the land and the maritime network.

Public maritime infrastructure needs to be improved or even developed in order to strengthen the ties between the new centralities developing around the ports and the numerous islands of the archipelago. The implementation of public transport on the sea would facilitate the living in the archipelago by creating a network between the new neighbourhoods.

Completion of the infrastructural network.

Infrastructure is an instrument that allows to densify and concentrate the urban structures along the Straits. Currently the public has almost no access to the coastline. The coastal sites are reserved for industries, private housing development and the protected mangrove forest. Only a few streets and paths on Batam actually lead to the coast. In order to facilitate the development of housing near the sea and to adjust the balance of priority of land use between social and economic interests, a coastal road could be built to complete the street network.
MANGROVE EXPANSION IN ADDITION TO PROTECTION

Mangrove forests present a valuable element both for the physiognomy of the coastline and for the maritime ecosystem, and need to be protected. However, possibilities for economical use of mangrove areas should not be underestimated. In the traditional approach, they have been used for firewood and construction material, while in the modern sense, they should be used as surfaces of CO2 compensation for industries, created to balance their impact. Therefore an expansion instead of a simple protection of the mangrove forests in the swamp areas is proposed.

BEYOND THE ARCHIPELAGO CITY

By densifying and guiding the urban development to the northern region of Batam Municipality and the Riau Province, it becomes possible to decelerate, or even to halt, for the time being the transformation of the quiet South. Thus, the natural paradise of the Riau Archipelago can be preserved and enjoyed by the population and visitors.

Water reserves and river estuaries need to be protected and preserved in order to guarantee the stability of the land, the healthy balance between the maritime and terrestrial ecosystems, as well as the quality of the water in Batam. Currently, water reserves are treated as strategic resources, and completely inaccessible to public. In the future, they could be reinterpreted and used simultaneously as public parks. Education programs could further sensitize the population to the fragility and the value of the water sources. This strategy would not only have an ecological but also the social effect, as no public parks are offered to Batam’s population so far.
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Kingdom Hydrographical Office.

The Maps on page 64-65 have been drawn by Tobias Wullschleger visualising data’s from Batam in Figures, 2010. Damien Romanows and Stephanie Grandjard have drawing sections and other graphics, based on google maps.

Pictures:

If not mentioned differently, Stephanie Grandjard and Ymiram Perret took the pictures.

F 182-183 Unknown author
F 162 Picture shot by Livio de Maria

Statistics:

The graphs base all either from information on the document Batam in Figures, 2010 or from presentations of the local government, such as Presentation for Papers Regional Planning and development Board of Batam City.

APPENDIX

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SOURCES:

Maps:

The Author redrawn all the Maps, The Regional Development Planning Agency of Batam City provided the basic dataset, GIS data’s, dwg files and PDF’s have been combined and interpreted.

As the maps did not always correspond to each other and were often older versions. google earth and google map has been used as a reference in order to get a current view of the territory.

The Sea Topography has been drawn by Martin Garcia, Magnus Nicoli on the base of nautical charts provided by the United