



# Opening The City, Completing The Region

Transforming Urban Life in Trans-National Tropical City of Batam

Degree Project in Sustainable Urban Design  
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Supervisor: Laura Liuke



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ASBM01 Degree Project in Sustainable Urban Design  
School of Architecture, Faculty of Engineering, LTH

Spring 2019

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**LUND**  
UNIVERSITY



# Acknowledgement

I would like to thank my supervisor, Laura Liuke and Housing Development and Management team, for the guidance throughout this final semester. Many thanks to Jenny B. Osuldsen and Pär Gustaffson for a very valuable insight to my project. Peter Sjöström, Andreas Olsson, Louise Lövenstjerne, and the SUDes family for the true inspiration during the two years of my studies.

To LPDP scholarship from the government of Indonesia who makes it possible for me to reach my education dream, I wish to have small contribution to my country through this project. Lastly to my beloved family, who accompany me across different seasons here in this beautiful Scandinavian land.



Barelang Bridge, Batam



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# Global Perspective

- Global Climate
- Global Connection



## Global Climate

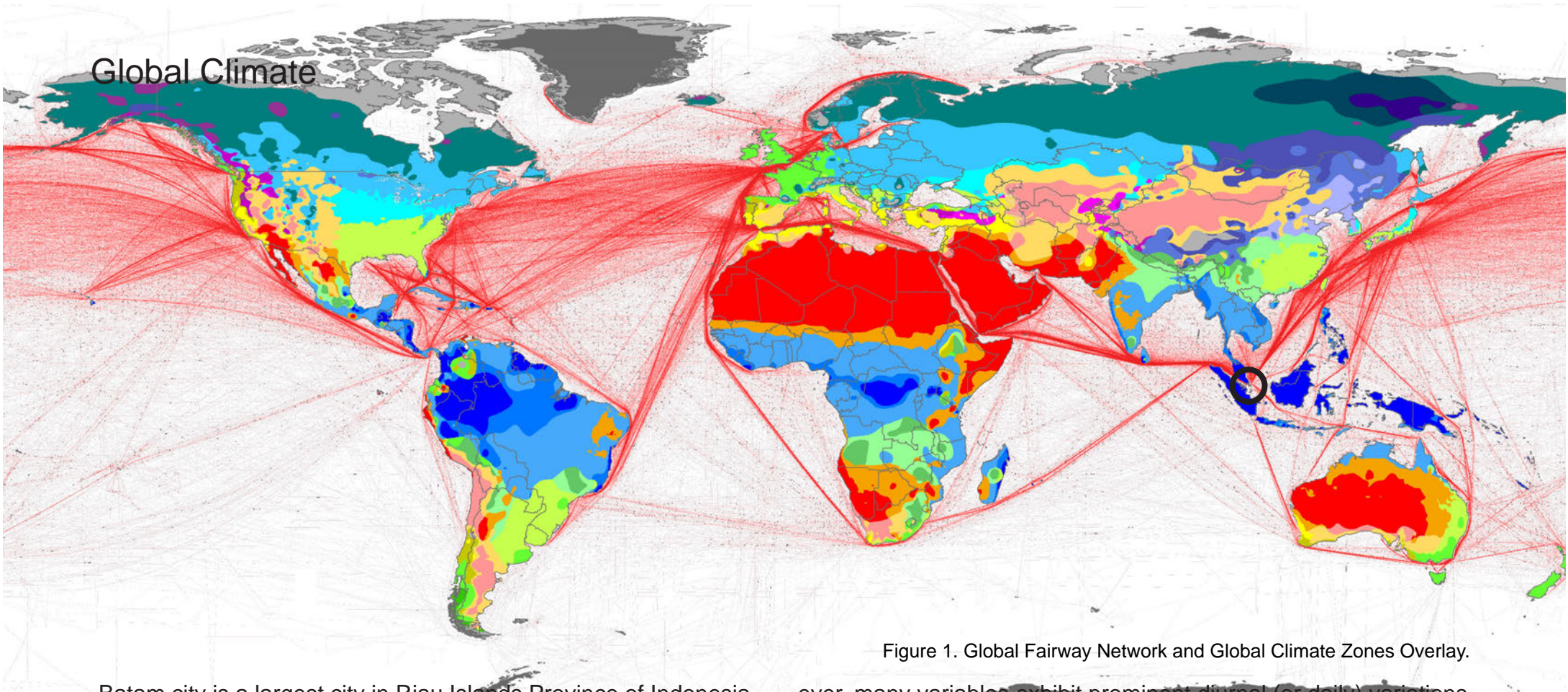


Figure 1. Global Fairway Network and Global Climate Zones Overlay.

Batam city is a largest city in Riau Islands Province of Indonesia. The city is located in the country border, and also part of multilateral economic cooperation Indonesia-Malaysia-Singapore Growth Triangle. As an industrial boomtown and emerging transport hub, Batam city is an important part of a functional regional labor market, known as SIJORI Region, one of a major city-region in Southeast Asia.

SIJORI Region is situated near the equator and has a typically tropical and fully humid climate (Köppen: af), with abundant rainfall, high and uniform temperatures, and high humidity all year round. Many of its climate variables, such as temperature and relative humidity, do not show large month-to-month variation. How-

ever, many variables exhibit prominent diurnal (or daily) variations from hour to hour, indicating the strong influence that solar heating has on the local climate. It is a part of important global hub of world fairway network. With the presence of Singapore Seaport, the region is at the doorstep of global logistic and commodity exchange.

World Bussiest Seaport, by shipment volumes (Reuters, 2014):

1. Shanghai, China
2. **Singapore**
3. Shenzhen, China
4. Hong Kong, China
5. Ningbo, China





SIJORI Region is also a very important regional hub of global airline network. The main hub is obviously Singapore's Changi International Airport which ranks the best airport in the world according to Skytrax for consecutive last 7 years. Batam city and Malaysia's Johor also have their own airports providing connectivity for national or local air traffic.

World Busiest Airport, by passenger number (world-airport-codes.com, 2018):

16. ...

17. Istanbul Ataturk, Turkey
18. Soekarno-Hatta Intl., Indonesia
19. **Singapore Changi**
20. Denver Intl., USA
21. Suvarnabhumi, Thailand
22. ...



# Trans-National Urban Regions Around the World



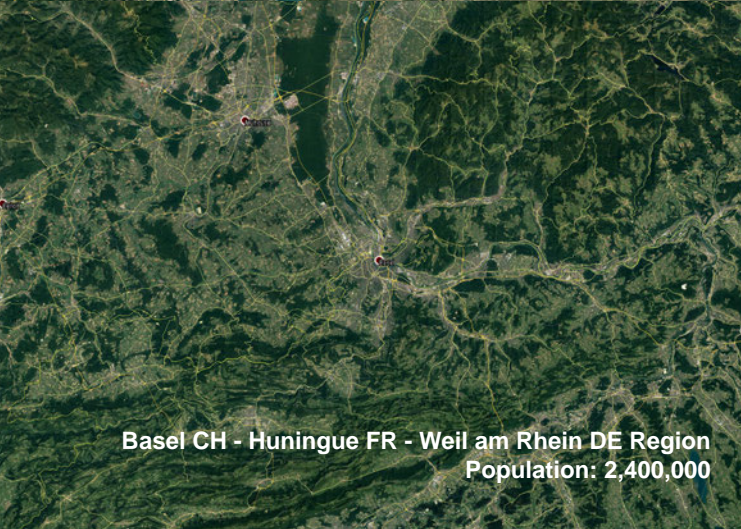
**Detroit US - Windsor CA Region**  
Population: 5,700,000



**San Diego US - Tijuana MX Region**  
Population: 5,100,000



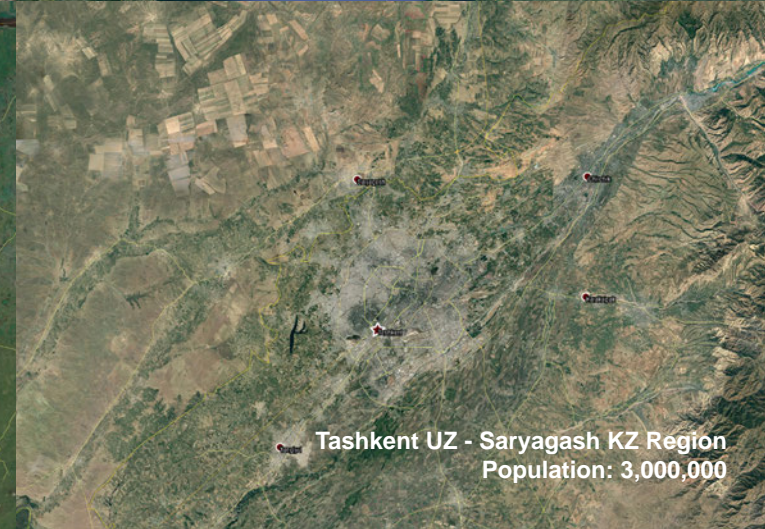
**Oresund DK - SE Region**  
Population: 4,000,000



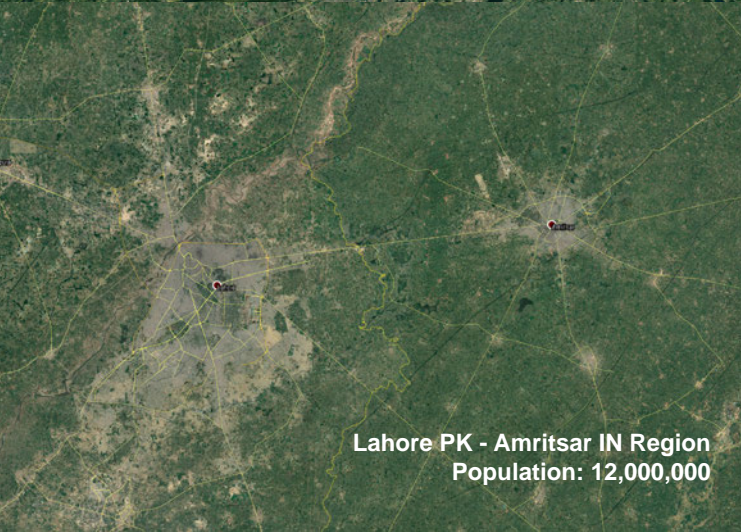
**Basel CH - Huningue FR - Weil am Rhein DE Region**  
Population: 2,400,000



**Kinshasa CD - Brazzaville CG Region**  
Population: 12,000,000



**Tashkent UZ - Saryagash KZ Region**  
Population: 3,000,000



**Lahore PK - Amritsar IN Region**  
Population: 12,000,000

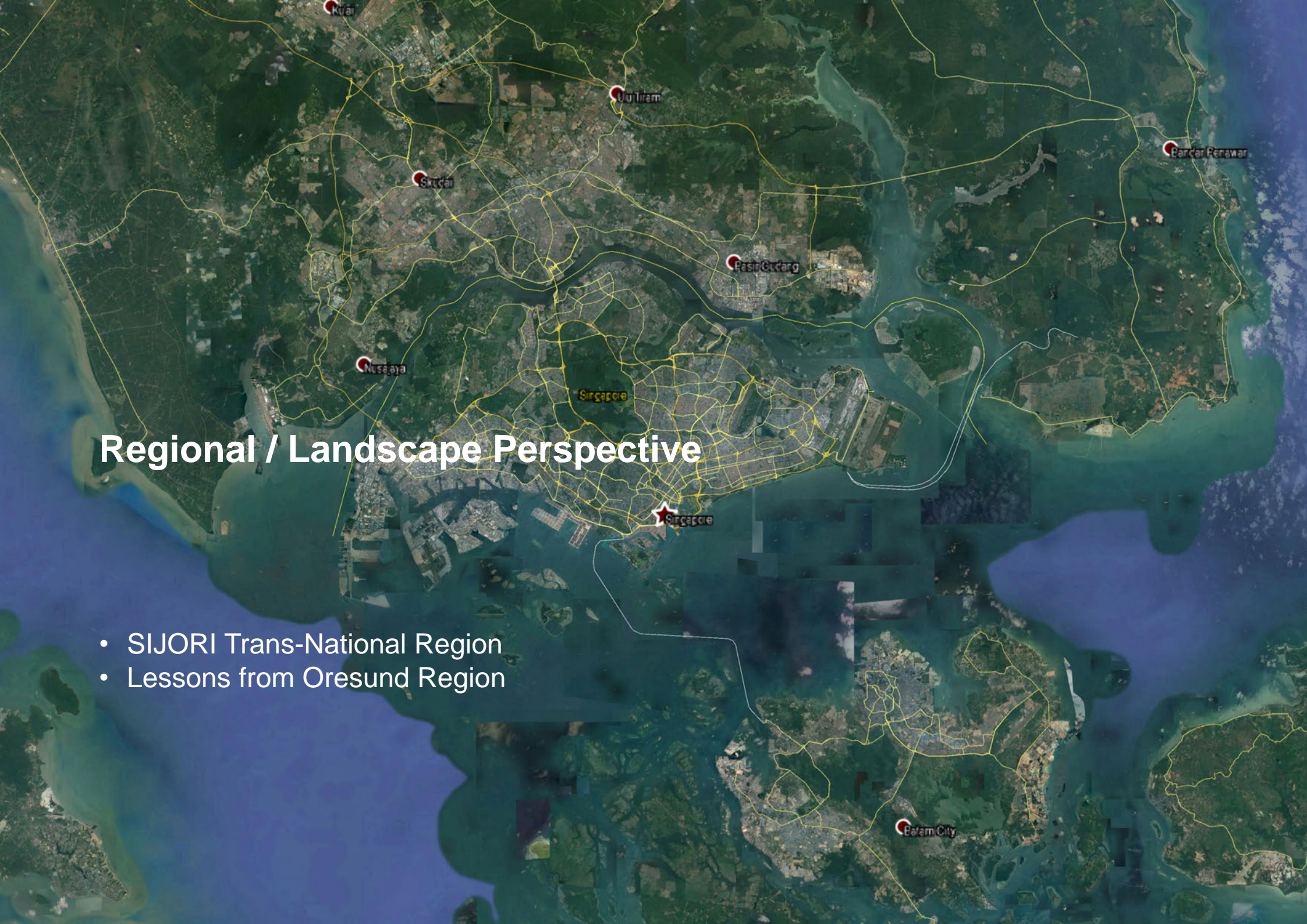


**Hongkong HK - Shenzhen CN Region**  
Population: 19,000,000



**Singapore SG - Johor MY - Riau Islands ID (SIJORI) Region**  
Population: 9,000,000



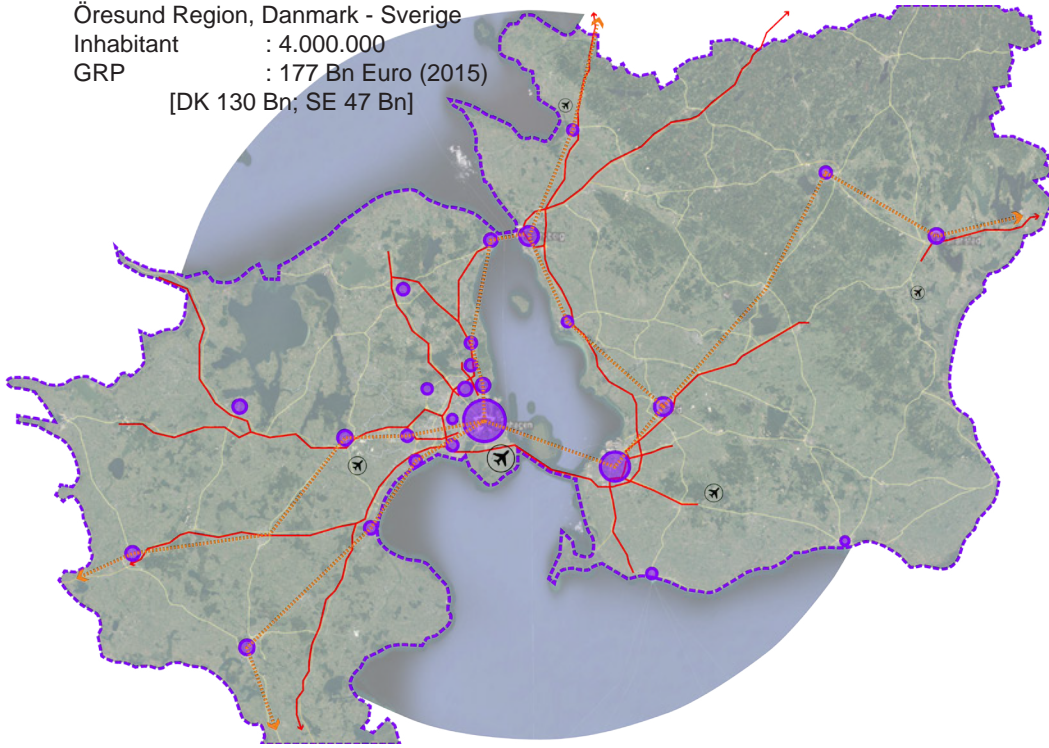


## Regional / Landscape Perspective

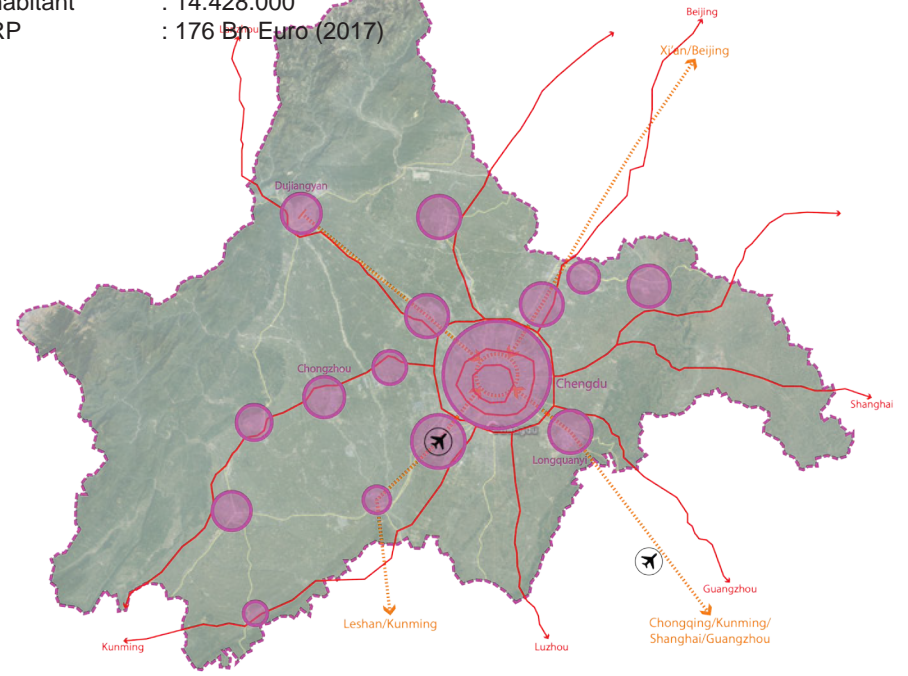
- SIJORI Trans-National Region
- Lessons from Oresund Region



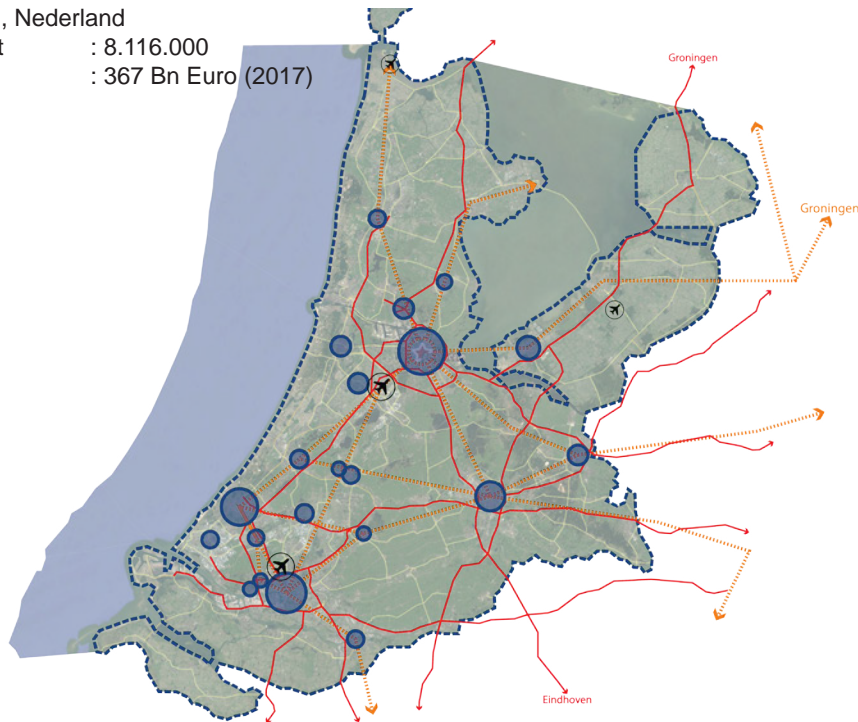
Öresund Region, Danmark - Sverige  
 Inhabitant : 4.000.000  
 GRP : 177 Bn Euro (2015)  
 [DK 130 Bn; SE 47 Bn]



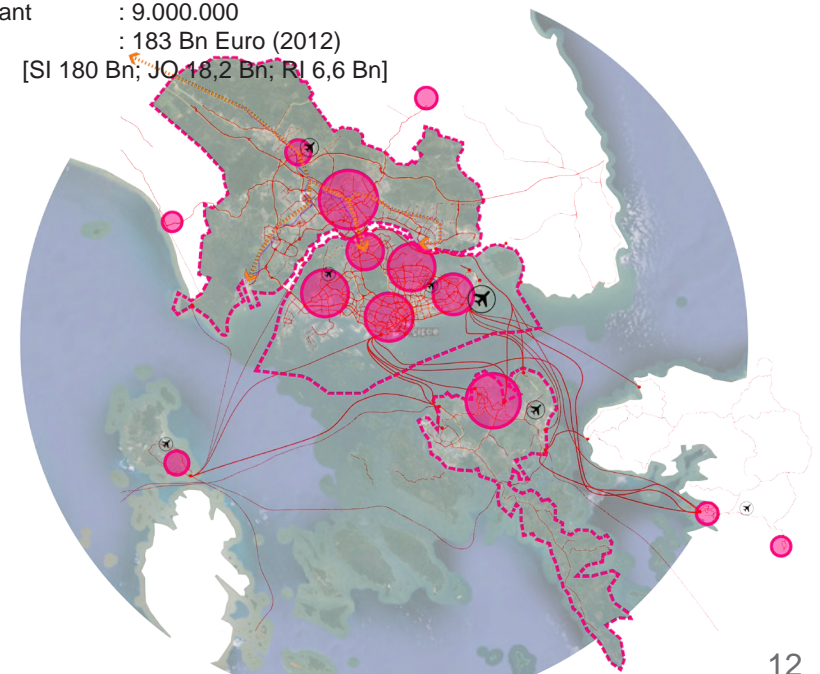
Chengdu, Zhōnghuá Rénmín Gònghéguó  
 Inhabitant : 14.428.000  
 GRP : 176 Bn Euro (2017)



Randstad, Nederland  
 Inhabitant : 8.116.000  
 GRP : 367 Bn Euro (2017)



SIJORI, Singapore - Malaysia - Indonesia  
 Inhabitant : 9.000.000  
 GRP : 183 Bn Euro (2012)  
 [SI 180 Bn; JO 18,2 Bn; RI 6,6 Bn]



12  
 Figure 3. Polycentric City-Region Around The World



## SIJORI Region

Singapore-Johor-Riau Islands (SIJORI) Region is one of major city-region area in South East Asia which work together within Growth Triangle framework. Three main cities work together, Batam (Indonesia), Johor Bahru (Malaysia), and Singapore. As one of the most rapidly growing area, the region share a lot of similar experiences from history, geography, to socio-economic context. But the portrait of today's built environment condition shows a tendency of different development pattern. Various factors play an important role in shaping this difference, and to understand that we need to take into account contexts from historical development to socio-economic of the local and within regional relationship.

### Historical Development

#### Growth Triangle as Economic-driven Framework

- 1994, MoU was signed by each government to jointly develop SIJORI area.
- 1997-98, Asia financial crisis hit Malaysia and Indonesia.
- 2004, Riau Islands split with Riau Province to be a new province.
- 2006, Malaysia launched Iskandar Malaysia Program, 2,217 km<sup>2</sup> new development area inspired by Shenzhen development towards Hong Kong. Rempang and Galang Island, and part of Bintan and Karimun Island is made into Free Trade Zone.

#### Cross-Border Region as Socio-Cultural and Anthropological Framework

Singapore has higher political position as city-state, compared to Johor and Riau which is not the central government of their nation-state. Regionally, SIJORI is characterized by core/metropolitan (Singapore) and periphery/hinterland (Johor, Batam) relationship.



Singapore Skyline. Source: flicker.com



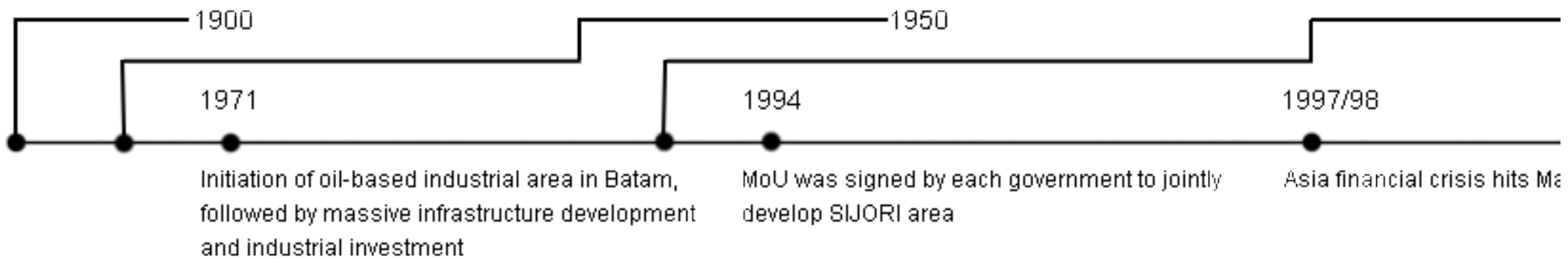
Johor Bahru Skyline. Source: pinterest.com



Batam Skyline



## Urbanisation Process



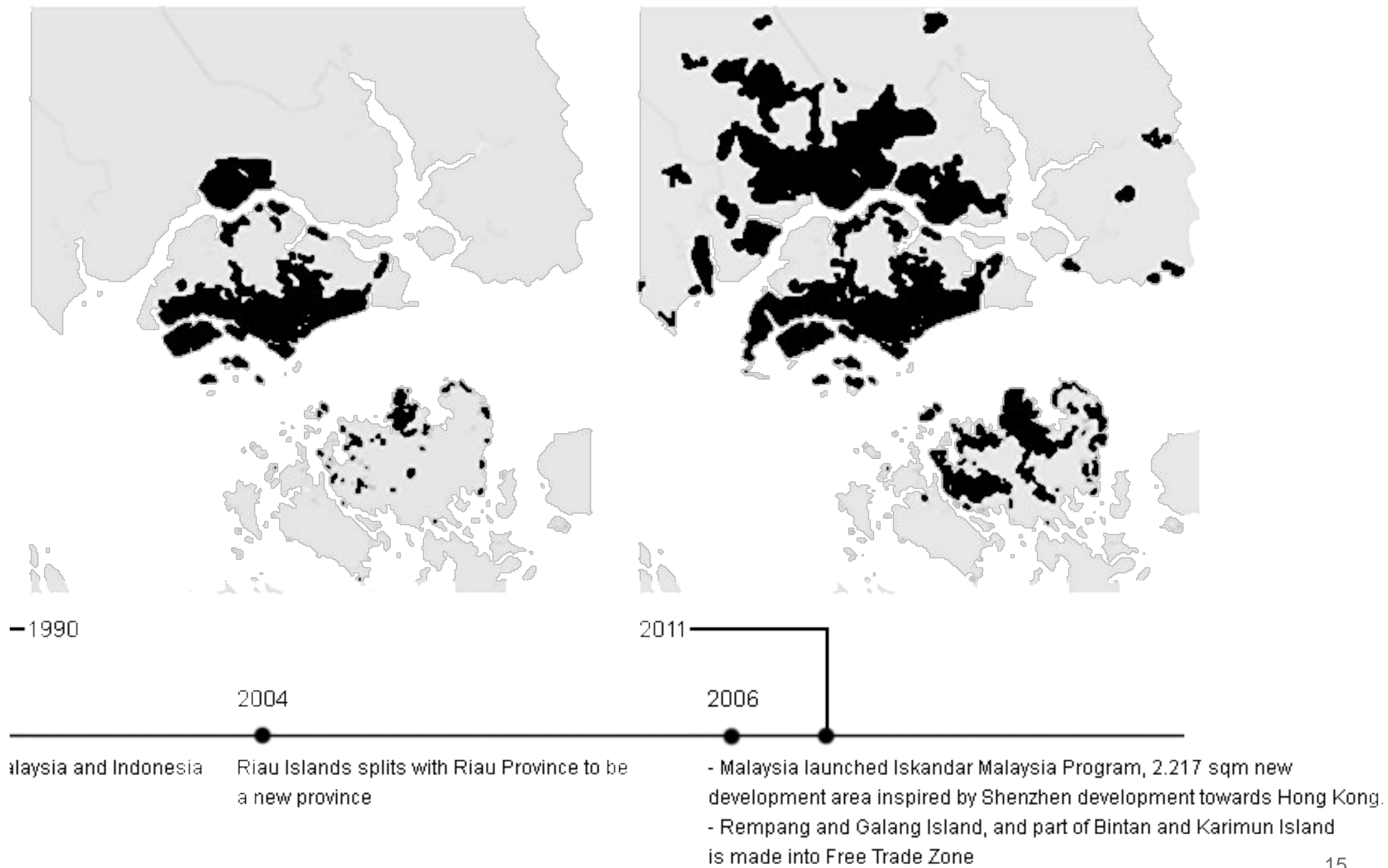
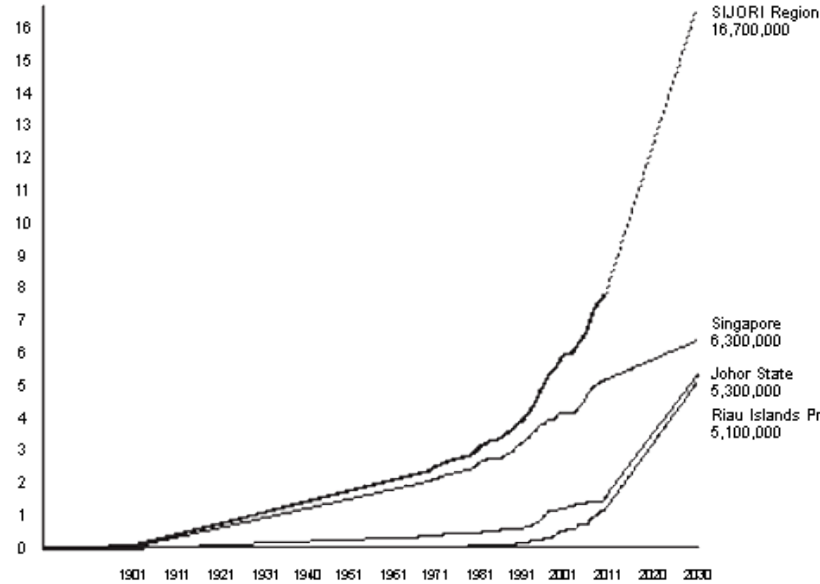


Figure 4. SIJORI Region Historical Development. Adapted from The SIJORI Cross-Border Region

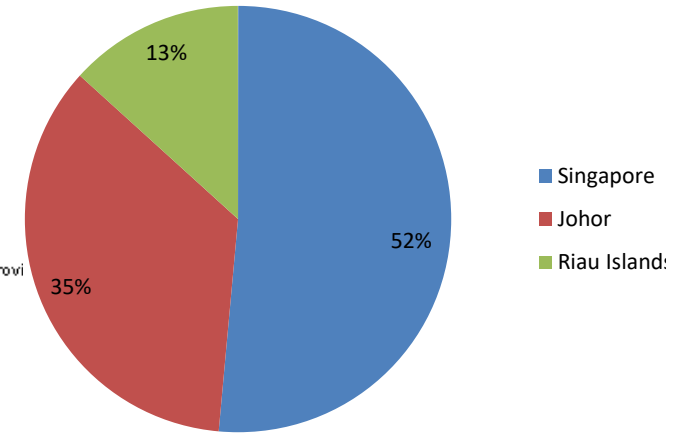
# Demography

Demographic study by Aris Ananta reveals that in 2010, the total population of SIJORI was 10.1 million, twice as of 1990's population with 5.8 million residents, when including the transient population in each of the three localities (6 months threshold for Indonesia and Malaysia, and 12 months threshold for Singapore). Projection study shows that SIJORI in 2030 could reach minimum of 16.8 million. Singapore is facing a bigger aging population issue because they have the lowest fertility level compared to Johor and PRI.

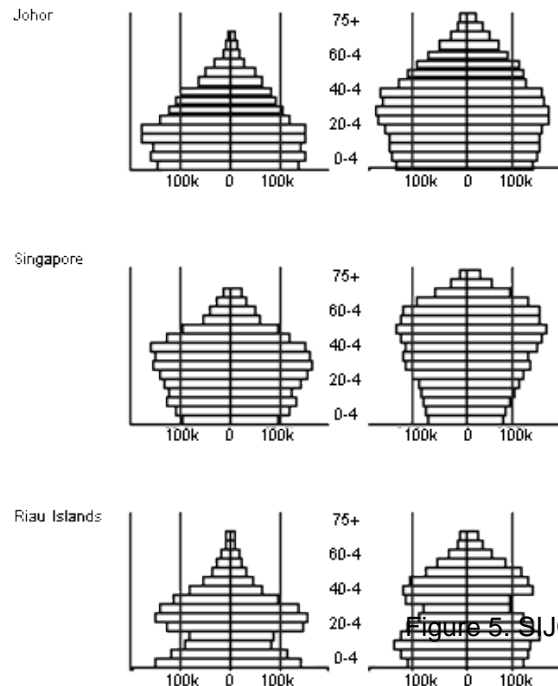
SIJORI Population Growth 2010 - 2030



Population Size by Region 2000



Changing Demographics 2012 - 2030



Population Size by Region 2010

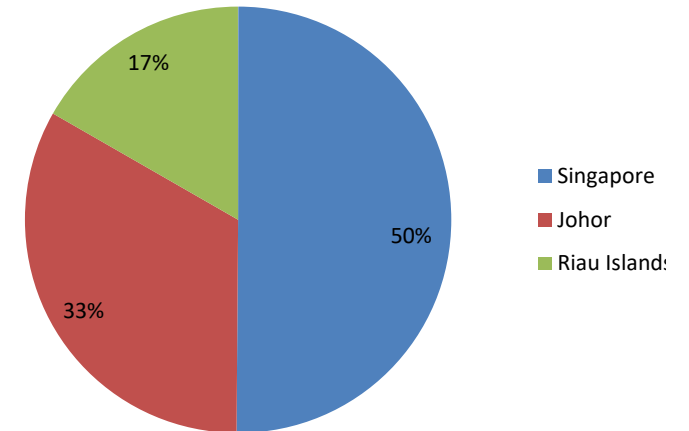
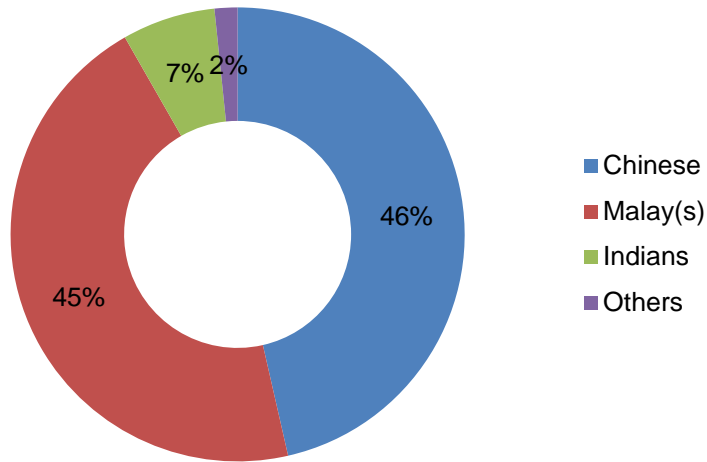


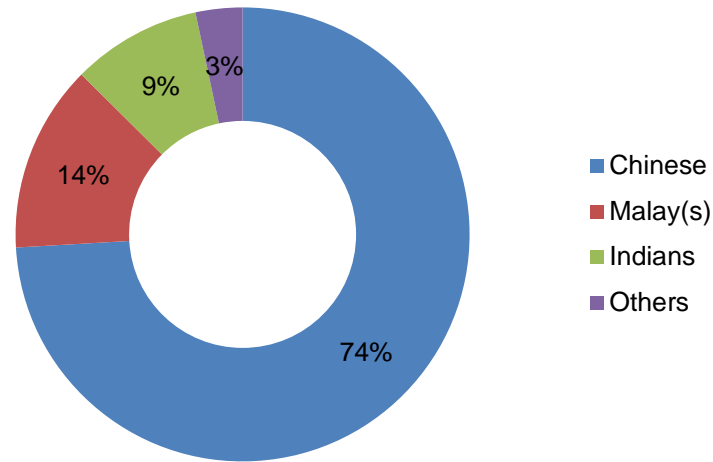
Figure 5. SIJORI Demographic Figures: Population Growth; Population Pyramids;



**SIJORI\***

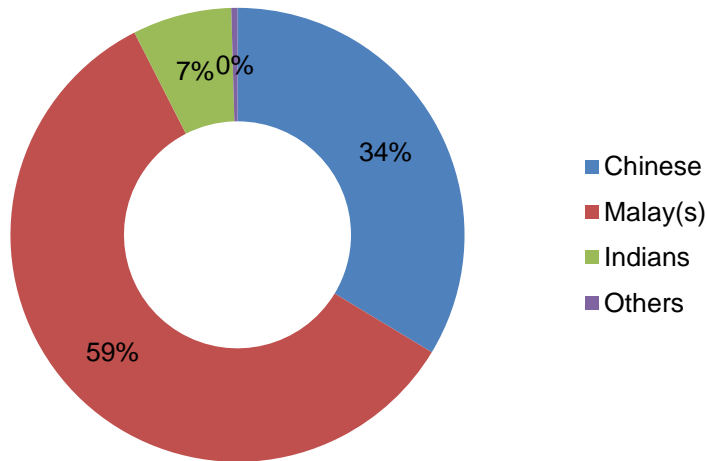


**Singapore 2010**



To portray ethnicity figure of Singapore, Johor, and Riau, we need to understand that there are different formal categories of ethnic definition, especially between Singapore and Johor, and Riau on the other hand. The first two administrations use generally three ethnic groups, namely Chinese, Malay, and Indian. For the case of Riau we can consider that in general all ethnic groups in Indonesia are Malay, however they may have transformed into separate identities over centuries.

**Johor 2010**



**Riau Islands 2010**

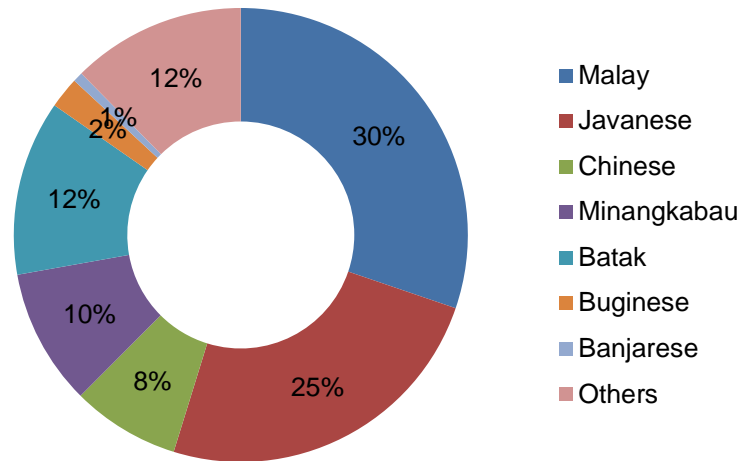


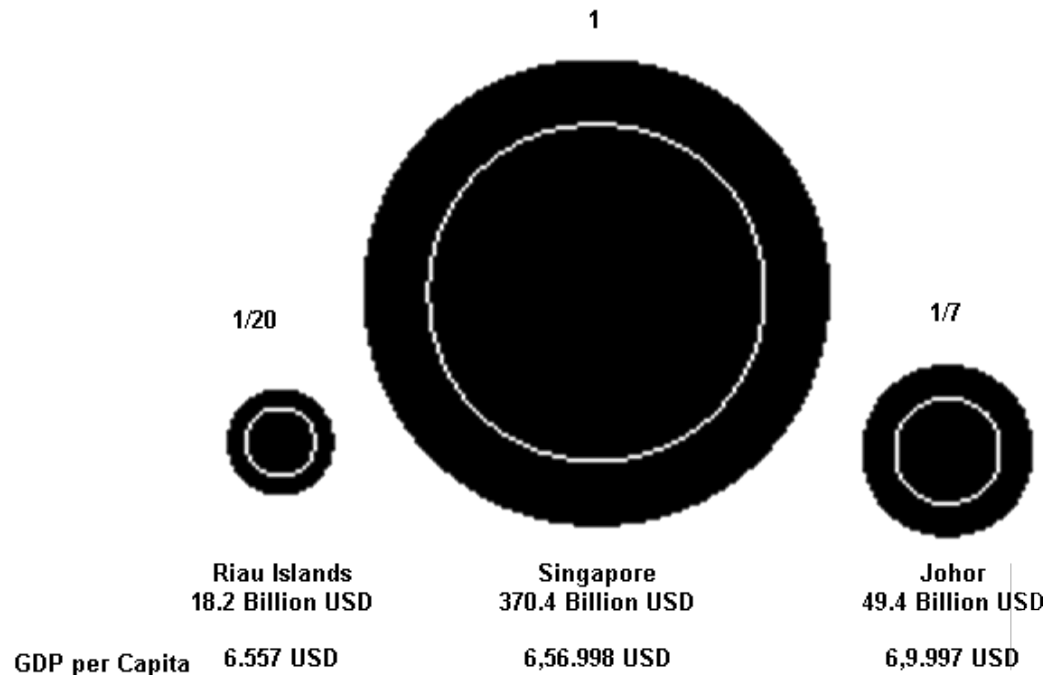
Figure 6. Ethnic Proportion of SIJORI Region

# Regional Economy

In 2013, the overall regional domestic product of SIJORI worth a value of USD 205 billion, of which Singapore constitute 88 per cent. Per capita calculation place Singapore as the wealthiest with USD 53.000 per inhabitant, among the highest in the world. Johor and Riau Island has GDP per capita of USD 8.000 and USD 5.300 respectively, regarded as middle-income economies by international standard, and in national term both are regarded as well-developed or above-average wealth.

Recent stimulative effects generated by cross-border interaction in trade and tourism, as well as national development initiatives, shape the projection for industrial composition change in SIJORI Region. In Singapore, its tertiary sectors (finance, trading, business services) contribute to more than 70% of the country's GDP, whereas manufacturing sector is likely reach 20% of GDP share as they try to encourage more manufacturing activities than other parts of the world, including Johor and Riau Islands.

## GDP Comparison 2012 - 2030



## Average Monthly Income 2010 (in USD)

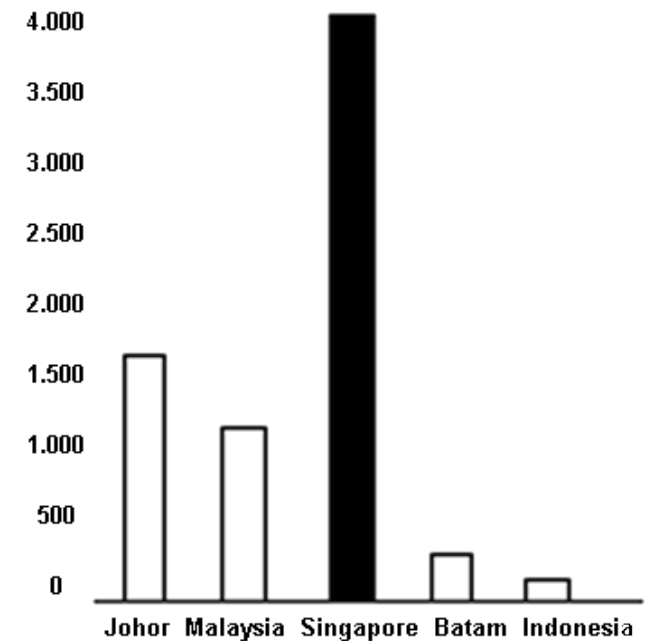
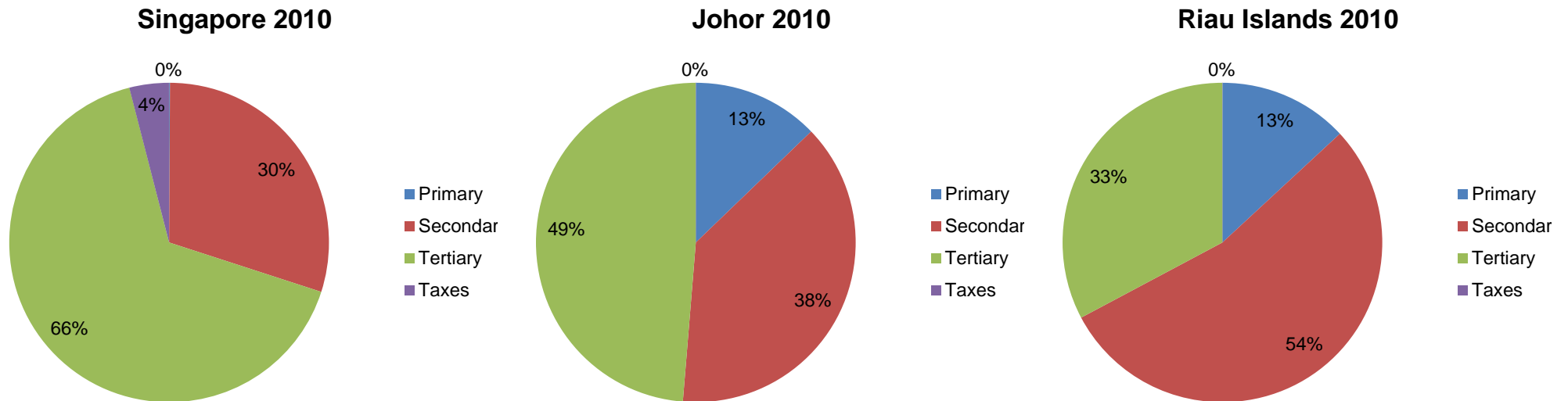


Figure 7. GDP and Monthly Income Comparison





The share of manufacturing is also diminishing in Johor and Riau Islands. For Riau Islands is expected to decrease from 46,8 per cent in 2010 to 31,7 per cent in 2030. Similarly, for Johor, it is expected to decrease from 34,7 per cent in 2010 to 23 per cent in 2030. The decrease in share is not because of the maturing of the manufacturing industries, rather a reflection of a rising importance and growth of other supporting industries in the service sector. Financial services, wholesale and retail trade are expected to grow substantially. Tourism and amenities also have a bright prospect as alternative sector in the future.

Economic Sector	
<b>Primary</b>	Agriculture
	Mining and Quarrying
<b>Secondary</b>	Manufacturing
	Construction
	Electricity, Gas & Water Supply
<b>Tertiary</b>	Utilities, Transport, Storage & Communication
	Wholesale & Retail Trade, Accommodation & Restaurant
	Finance, Insurance, Real Estate, Business Services
	Other Services

Figure 8. SIJORI Region Economic Sector Proportion

# Regional Analysis Map

- Connection
- Train line
- Built up area
- Kampung settlement
- Resort
- Golf course
- Tourism cluster
- Fairway

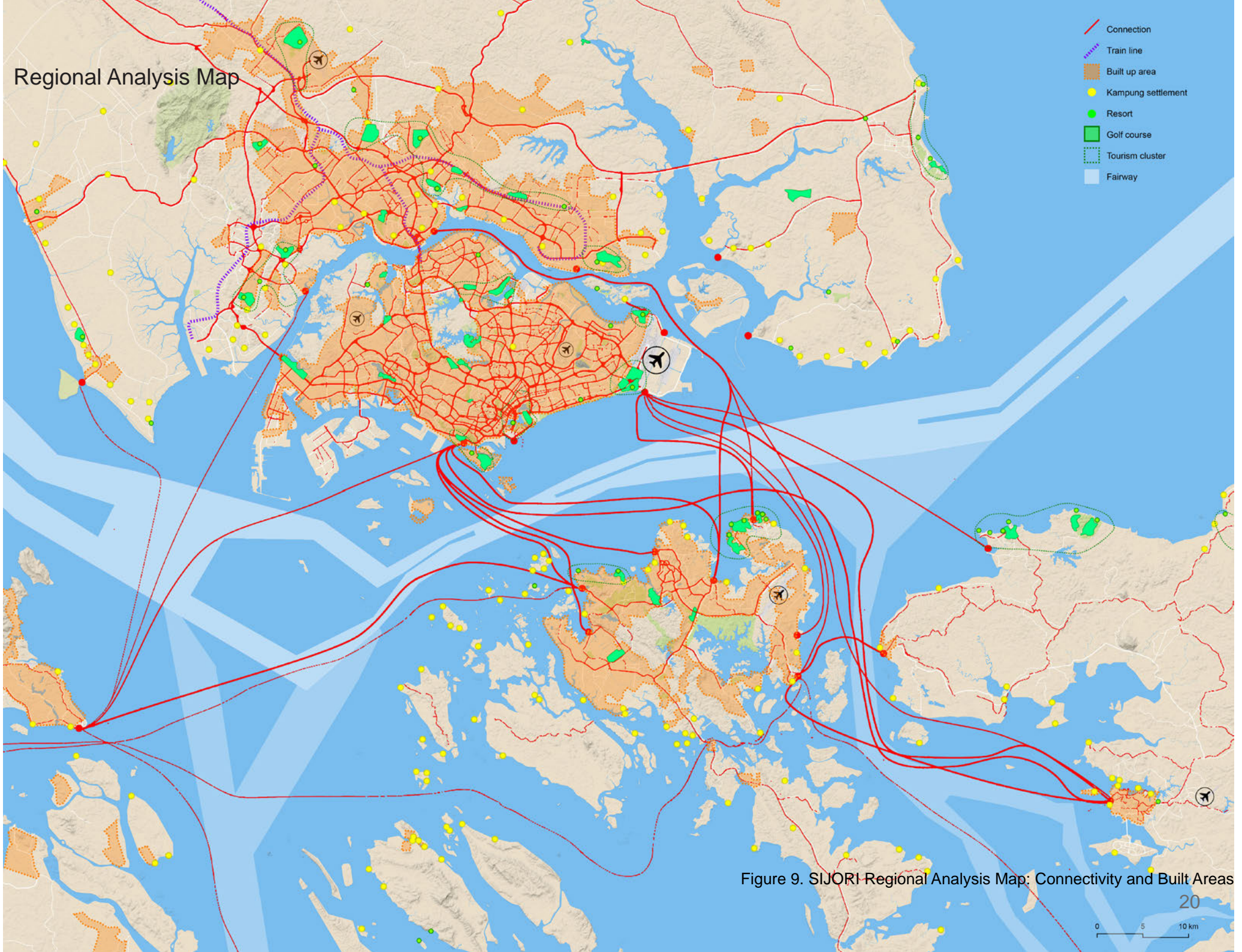


Figure 9. SIJORI Regional Analysis Map: Connectivity and Built Areas





## Regional Connectivity

Singapore is the center of gravity for this region, as it is the main economic power and geographically located between Johor and Batam. In term of connectivity, there is a difference scheme between Singapore-Johor and Singapore-Batam. The island of Singapore is separated by relatively narrow strait where as to reach Batam from Singapore we need to cross wider and busy strait of international trade line.

Between Singapore and Johor there are currently two bridges / causeways that link each city, providing direct access for commuter, and there are also plans to build a high-speed rail line connecting Kuala Lumpur and Singapore, and another bridge to the east. Travelling between Singapore and Batam is relatively more challenging because nowadays we only have one option which is by ferry. It takes from 30 minutes to one hour to reach different ferry terminals in Batam from Harbour Front Ferry Terminal. To Batam Centre it takes approximately 45 minutes.

Commuting figure of the region reflects this condition. The number of daily commuters of Singapore-Johor is approximately equal to the number of monthly commuters of Singapore-Batam. Recently commuting flow of Singapore-Johor is around 250 thousand trips daily.

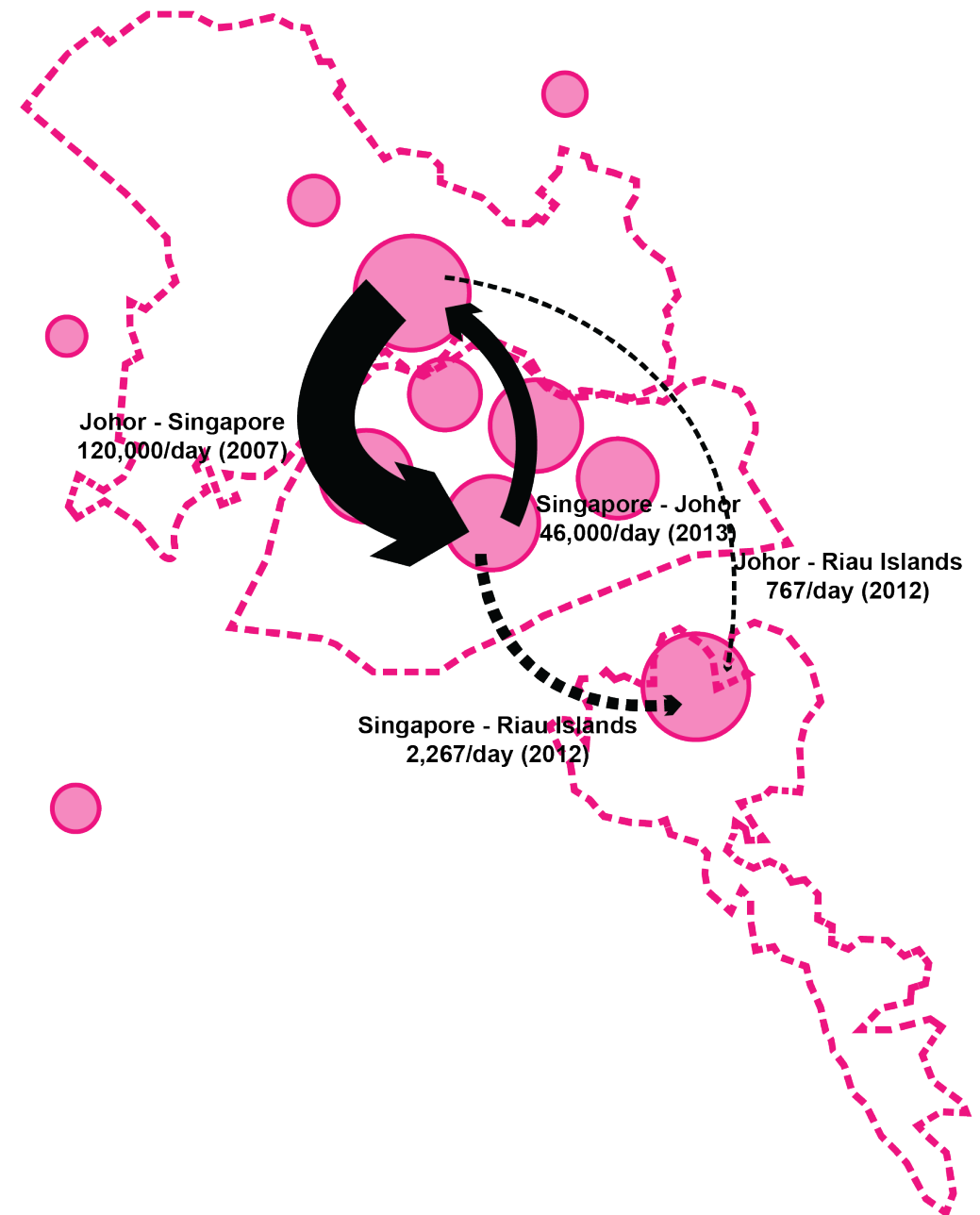


Figure 10. SIJORI Region Commuting Figures

# Regional Analysis Map

- Industrial Park
- Land reclamation area
- Land reclamation plan
- Water reservoir
- Water pipe line

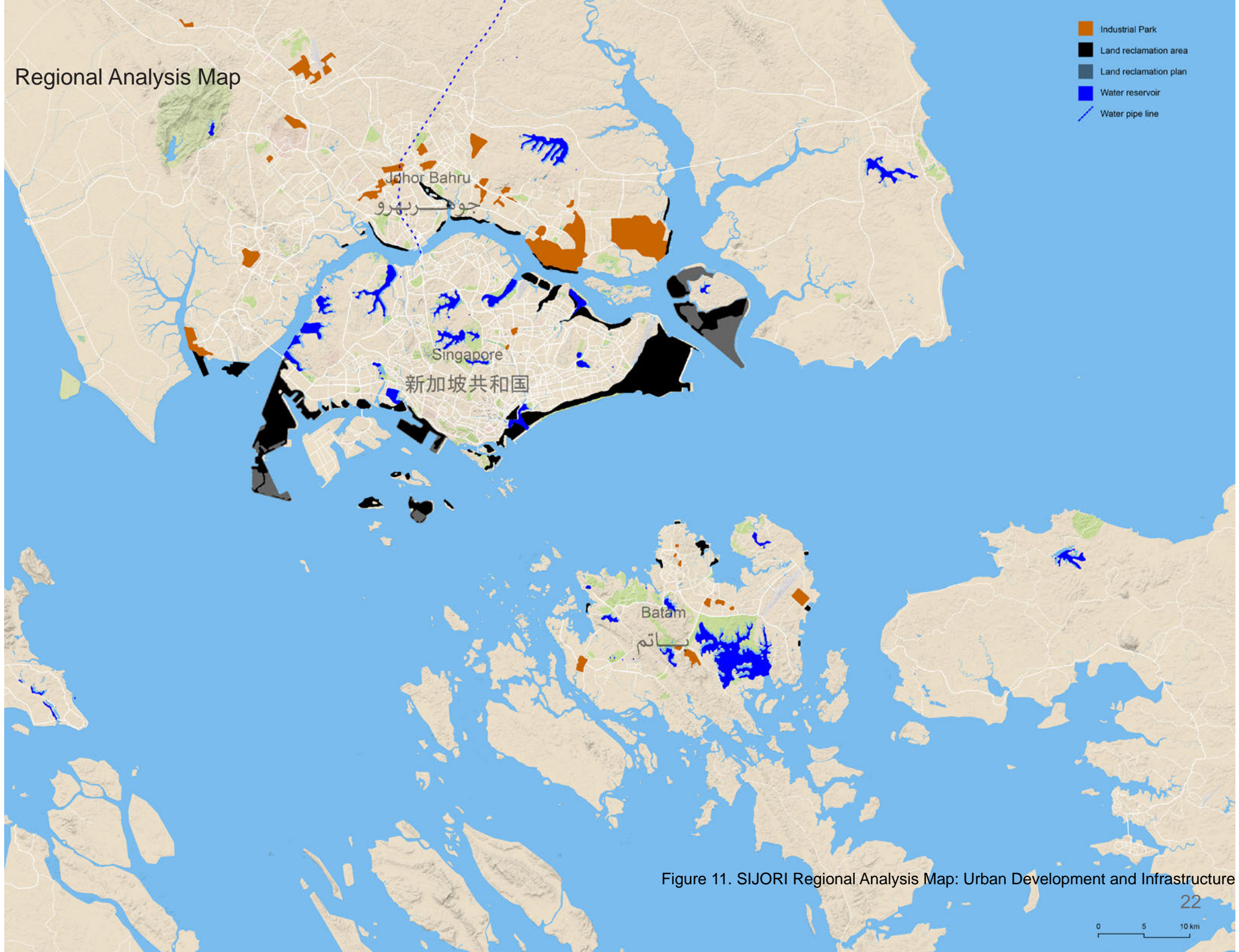


Figure 11. SIJORI Regional Analysis Map: Urban Development and Infrastructure



## Regional Development

Rapid urban development in the region is driven by several sectors. Large scale industrial areas as the initial driver are spread in different areas in Singapore, Johor and Batam. Each city develops their own logistic hubs, with the largest seaport located in eastern part of Singapore, making it an important global site.

Because of land scarcity, Singapore is undergoing a massive reclamation project to expand its land area. Although Johor and Batam have relatively vast land areas, but this pattern of reclamation can also be found in these cities, limited around the already congested city center.

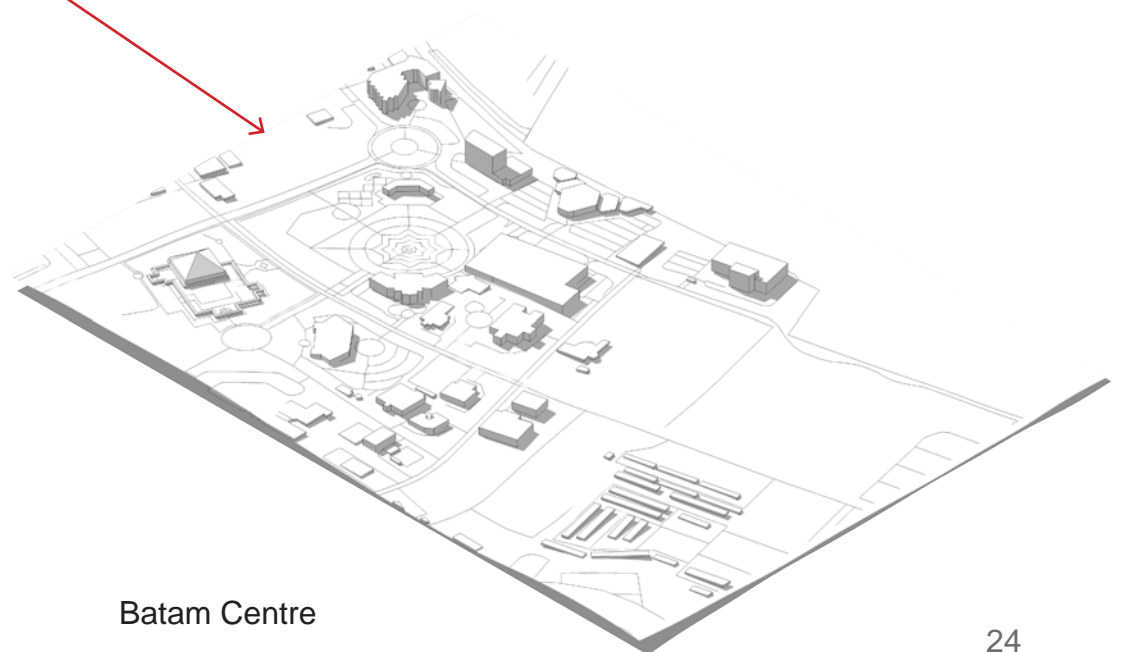
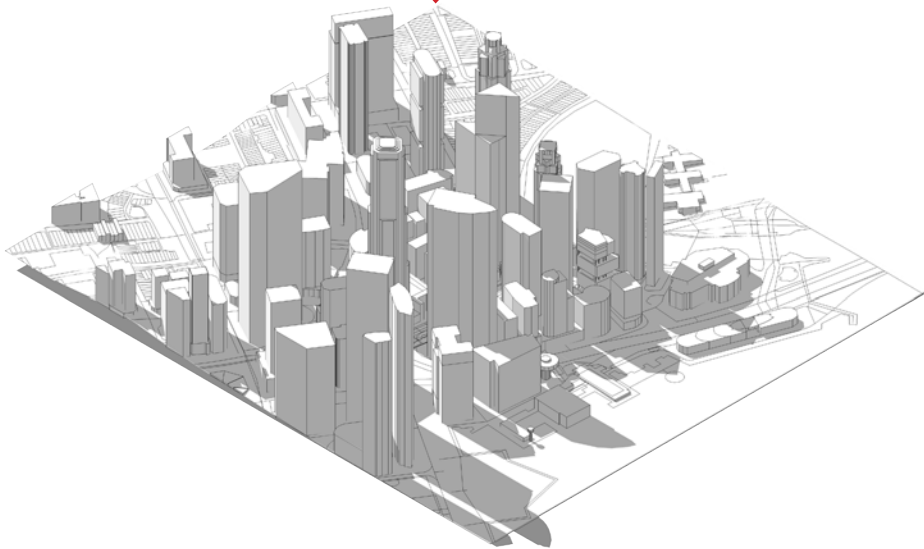
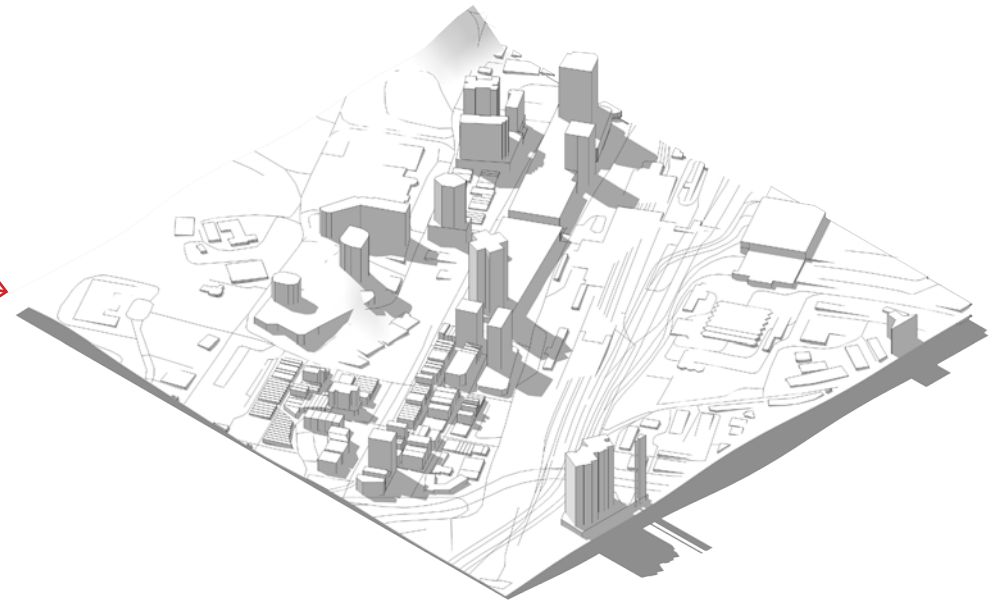
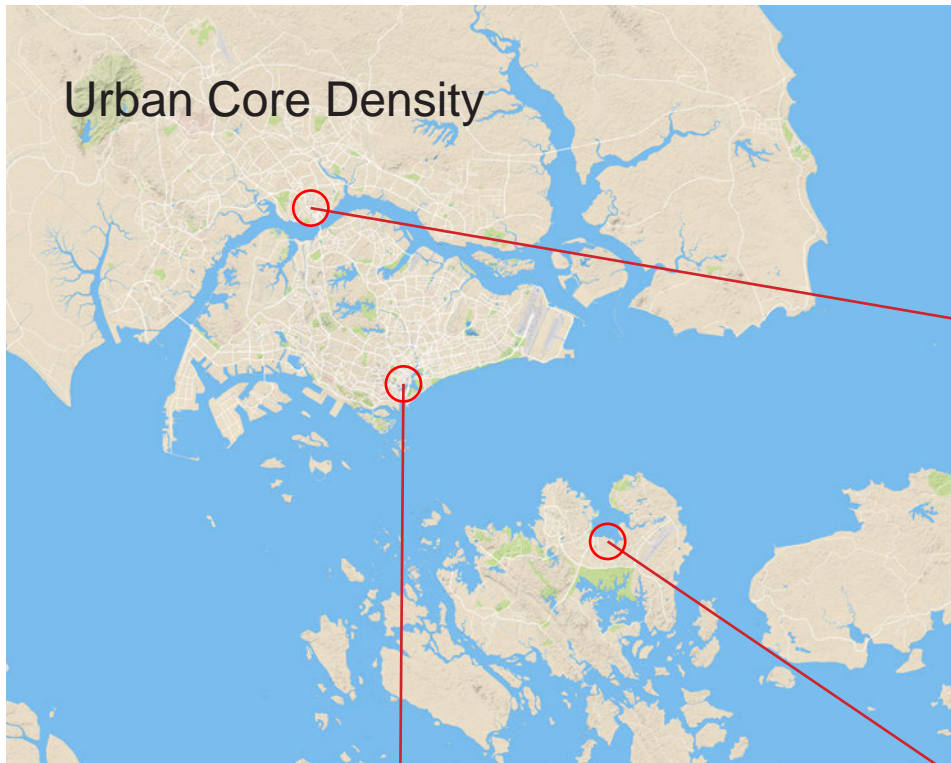
Water is one of the most important issues, especially for the island city of Singapore and Batam. Both of these cities made a big reservoir to fulfill their water consumption needs. For Batam it is calculated that they can still sustain their demand locally, but Singapore has to import fresh water from Johor through the pipeline infrastructure. Singapore is developing their own water desalination installation and has built several plants to reduce their dependency of imported water and meet up 30% of their water needs by 2060.



Duriangkang Dam, Batam. Source: batam.tribunnews.com



Tuas Desalination Plant, Singapore. Source: youtube.com



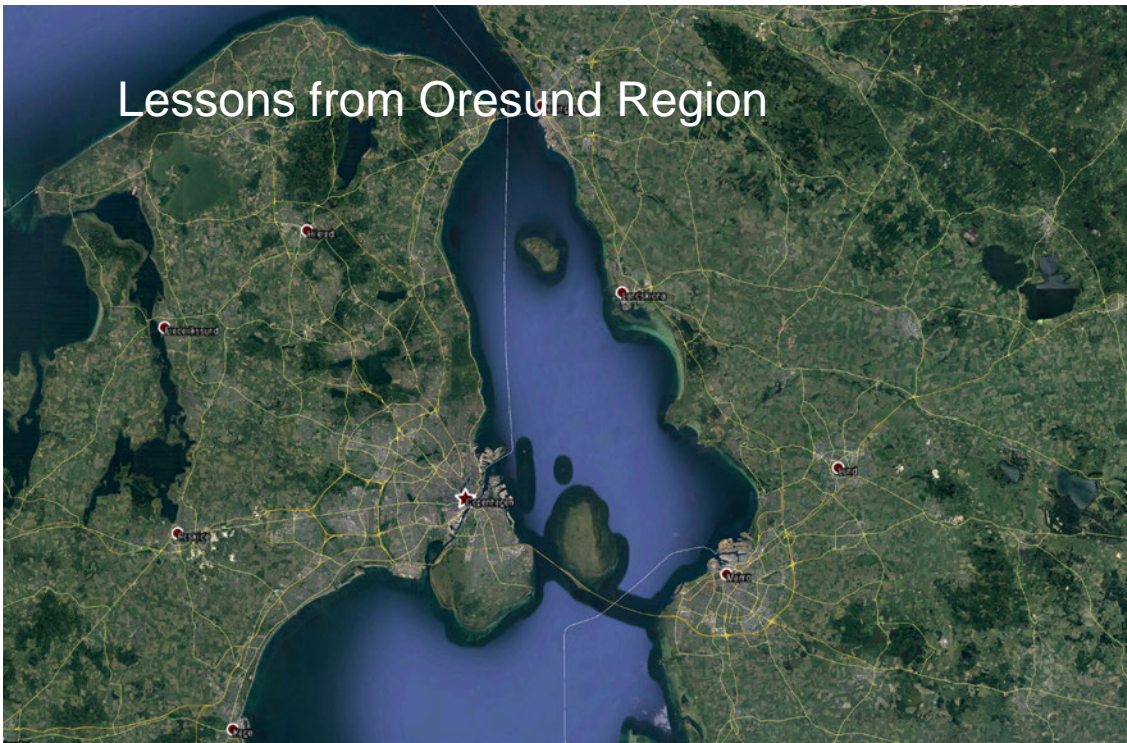
Downtown Singapore

Batam Centre

Figure 12. Density Study of Different Urban Core in SIJORI Region



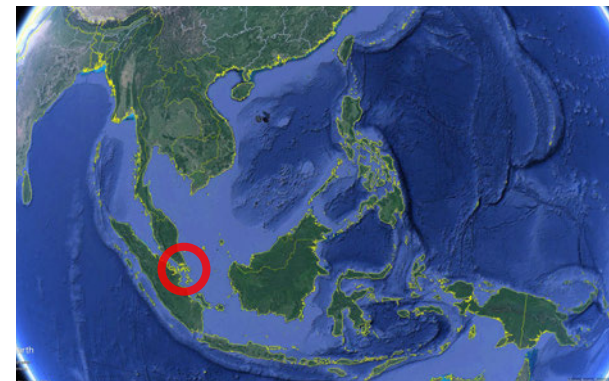
## Lessons from Oresund Region



Oresund DK - SE Region  
Population: 4,000,000

Oresund Region has its own model for cross-border urban agglomeration. Their long history with all of the dynamism they have provided us with a good example for our case in SIJORI, in terms of understanding urbanization trends and also balancing the level of development of each side.

- Recent trend: The Competitive Region and urban Renewal; Urban Models and Dilemmas
- Examples of urban development projects



Singapore SG - Johor MY - Riau Islands ID (SIJORI) Region  
Population: 9,000,000





Sluseholmen, Copenhagen



Ørestad Syd, Copenhagen



Västra Hamnen, Malmö



Hjärup, Staffanstorps



## Lessons from Oresund Region

### Reflection

As our reference for sustainable region, we can take many lessons from Oresund Region.

### Environment

Eventhough there are many potential debates, according to many ranking of sustainable and livable city, Copenhagen ranks among top cities globally. Nature and public spaces are a big part of urban development strategy, as well as a way to deal with natural challenge such as periodic extreme cludburst and sea level rise.

### Economic

Connectivity is the backbone of Oresund Region that supports the development of vast area within the region and making it one of the most vibrant and competitive region in Europe to attract new talents. Sets of transportation infrastructure, like regional train network and international airport, integrated with good quality local public transport is the key infrastructure of the region. Good economic climate resulted in fast coverage of investment on connectivity infrastructure, stimulating further development in most of the cities of the region.

### Social

Open and borderless is an impression of this region. Commuting figure is always increasing and become the driver of regional dynamic. Oresund Region brand it self as a family friendly place, a unique positioning and characteristic in comparison to other major global region. There are many urban development project with innovative architecture in different cities and town with diverse target market, not only dominated by the big cities of Copenhagen or Malmo.



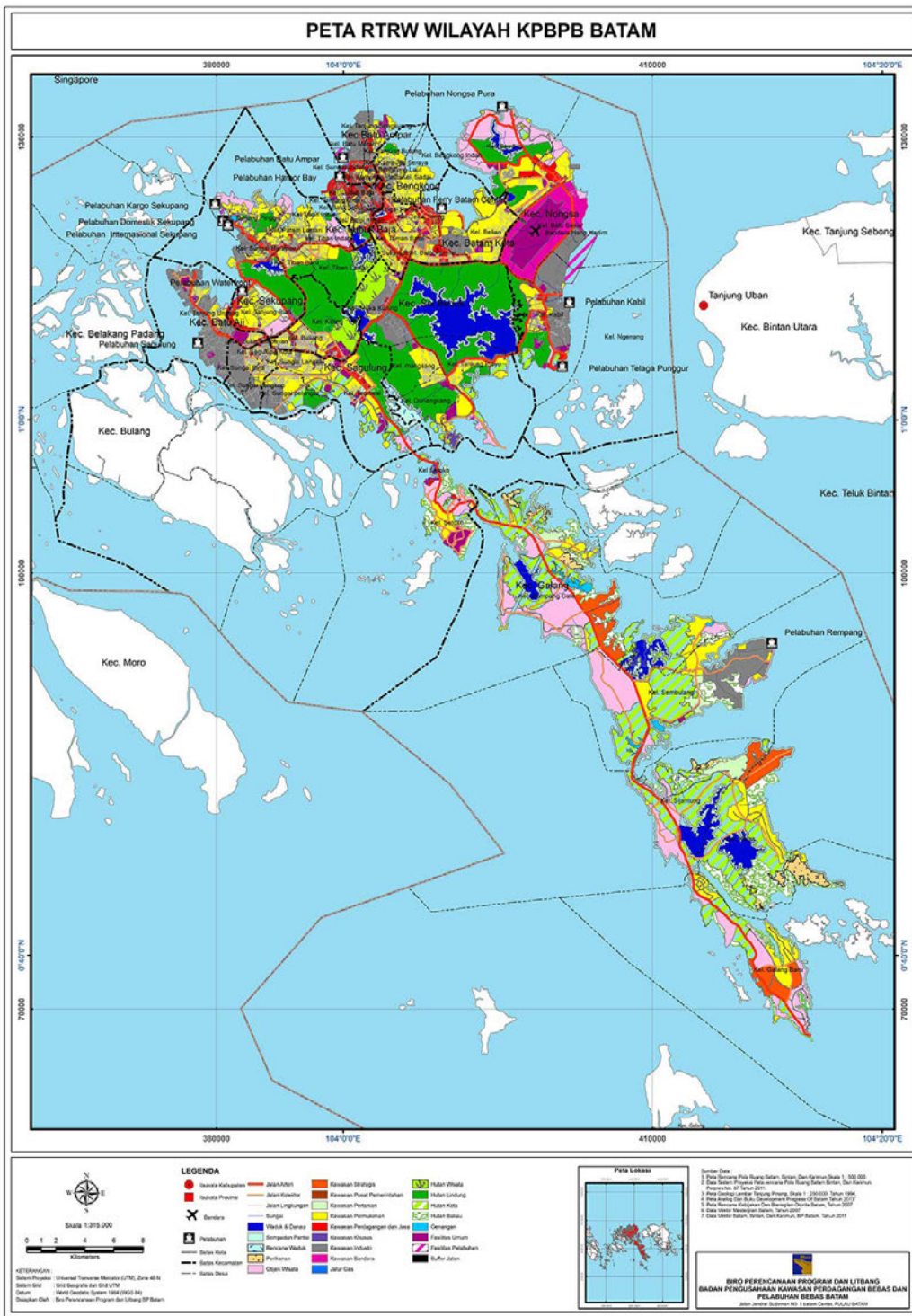




## City / Site Perspective

- Batam City Profile
- Green City Action Plan Batam 2035
- Local Climate





## Batam City Profile

Batam is a newly emerging big city which is uniquely planned and designed by Indonesian authority, unlike other bigger and older cities that usually have an influence from colonial era planning system. The city consists of three main islands, Batam, Rempang, and Galang that are connected by a bridge network, with total land area of 715 km<sup>2</sup>. And with population of 1.24 million, grow from 6000 inhabitants in less than five decades, today Batam city has an urban density of 1.750 inhabitants/km<sup>2</sup>. It is the 8th largest city in Indonesia by population and listed among cities above 1 million inhabitants.

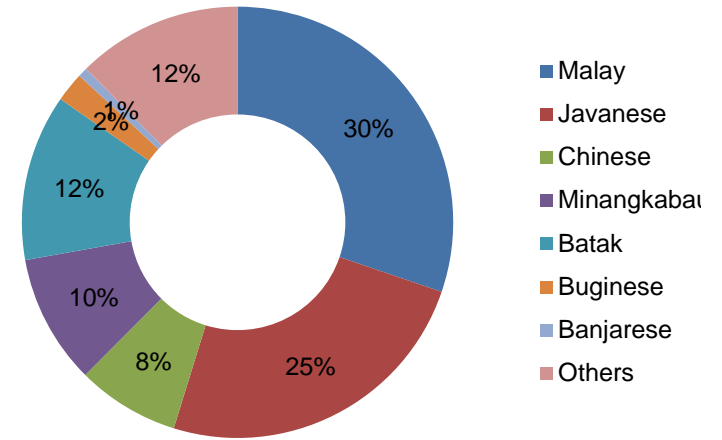
As part of Special Economic Zone (SEZ), Batam has unique governance system compared to other cities beside its traditional administration headed by people-elected city mayor. Batam Development Board (BP Batam), an authority which has a direct coordination to Jakarta, plays an important role to manage land governance and investment in the islands city.



Bareleng Bridge Batam. Source: 500px.com

### Batam Demography

Batam is an ethnically diverse urban area. Traditionally being a home for Malay people, it accommodates many people who come from many places all over the country. Today's figure shows that Malay is a dominant ethnic group which constitutes around a third of the population, followed by Javanese, the country's largest ethnic group that contributes a quarter. Different people from mainland Sumatera (Batak, Minangkabau), Kalimantan (Banjar), Sulawesi (Bugis), and other places have also settled in this fast-growing city and establish a multiethnic city.





## City, Culture, and Tourism

With manufacture sector contributing to biggest share of Batam economy we can see industrial areas are spread throughout the city. They are located mainly in the east and west coast of the island taking advantage of the access to the sea.

As for tourism cluster of Batam, they are also generally located in the coastal area, especially in the north coast with direct view to Singapore's skyline. As a result, the coastal area from east to west through north side is congested by built areas.

Kampong, or a traditional settlement, is a common pattern in Batam, sprawling together with the growth of the city. Many fishing villages located in smaller islands around Batam are inhabited by the native Malay communities where they can secure land tenement and live close to their traditional source of livelihood.

As today, we can see tall buildings are starting to emerge through construction of new urban development projects, but it is still not yet part of the culture of local residents to live a vertical life style. And the density that Batam has is still being accomodated by relatively over-crowded low-rise built environment.





## Urban Infrastructure - Urban Form, Batam

Batam has no rail-based transportation system and depends on the road-bridge network that connects Batam Islands for its public transportation system. Bareleng Bridges, series of bridges connecting Batam, Setokok, Rempang, and Galang island are the backbone infrastructure and also icon of the city. Seaport is very important for the islands connection internally and with international destinations in SIJORI Region.

Bus, minibus and car (angkot) is a traditional public transportation mode, complemented with car taxi, and motorcycle taxi (ojek) is very popular for short distance trips. Today we see, as in others Indonesian cities, that online ojek is getting more popular as a new cheap choice for residents. Generally motorcycle is favoured by many people because it is quick and easy to ride through the dense settlement areas where a lot of workers live.



Online motorcycle taxi. Source: gojek



# Green City Action Plan Batam 2035: Green City Profile

## Green Transportation

Traffic congestion has not yet acquired critical proportions in Batam, but needs to be anticipated as a result of rapid urbanization. Since Batam's built-up area is not very dense, it has good potential for nonmotorized transport (NMT). Shaded/canopied pedestrian walkways and bicycle paths (essential in tropical climates) can be segregated from automotive roads.

## Climate Change

As outlined in Indonesia's National Action Plan for Climate Change Adaptation, the projected rise in sea levels has a strong potential to become a serious threat because of the country's many maritime and coastal activities. Around 2050, global warming is expected to raise seawater levels to 35–40 centimeters above current levels. The maximum sea level rise in Indonesia could reach 175 centimeters by 2100.

In addition, the GCAP strategy to 2035 anticipates the development of a BRT system.

Baseline	Number of Motorized Vehicles	% of Citizens Using Public Transport
2015	5,531,777	3.0

Source: BPS Statistics 2015.

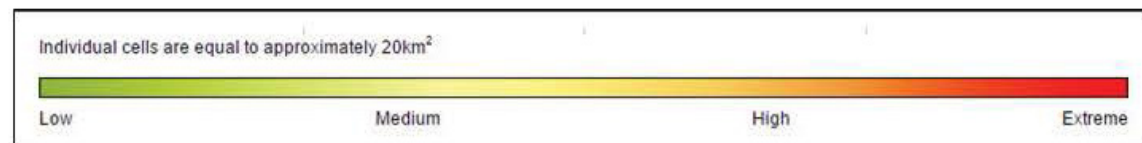
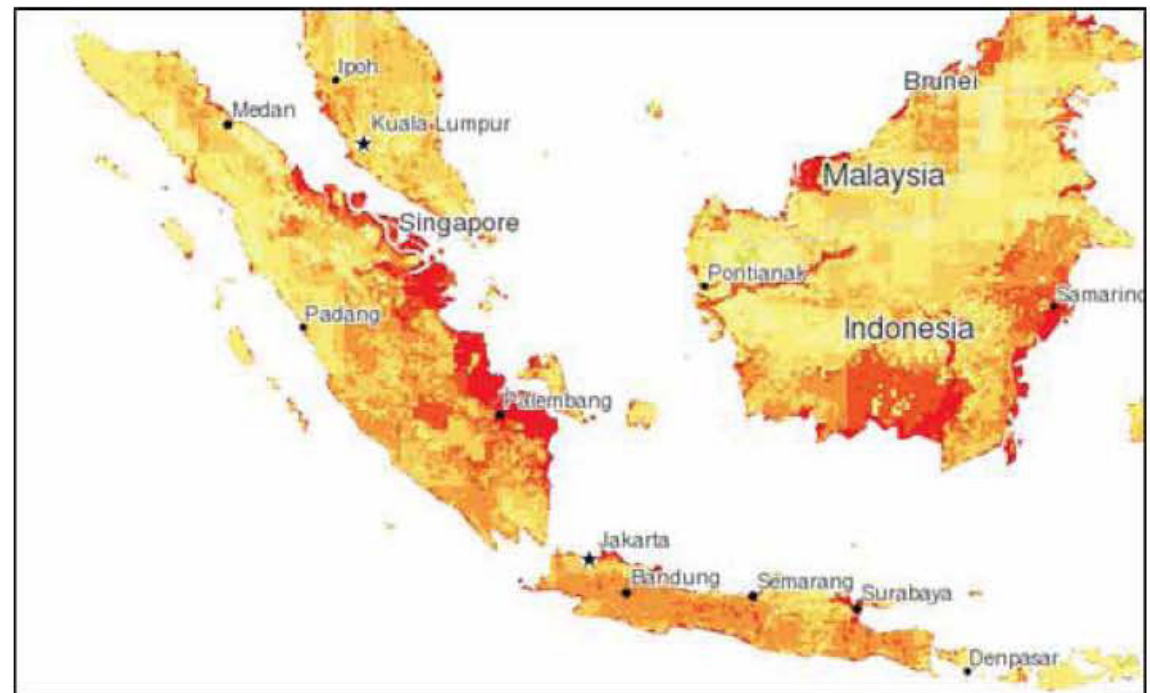
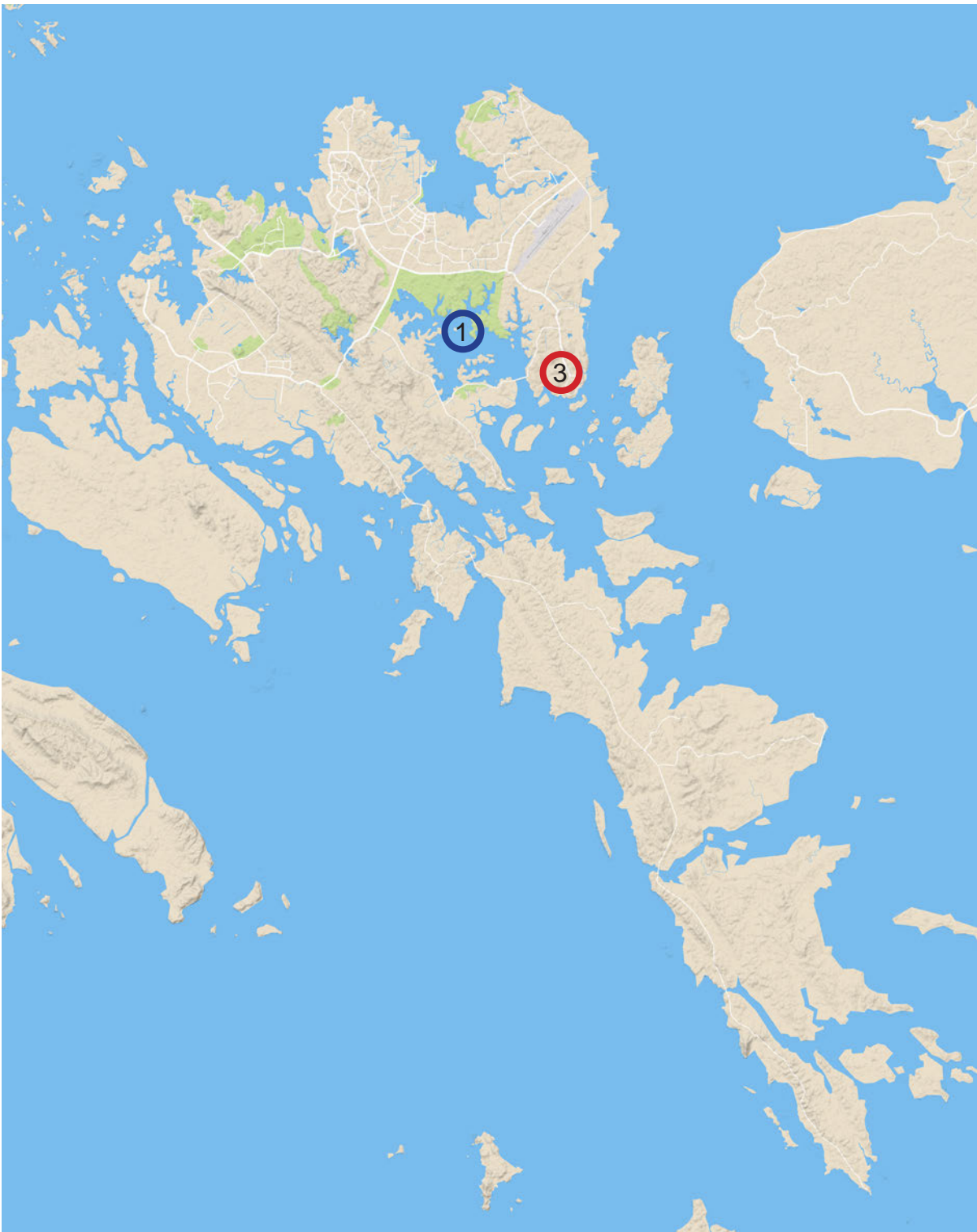


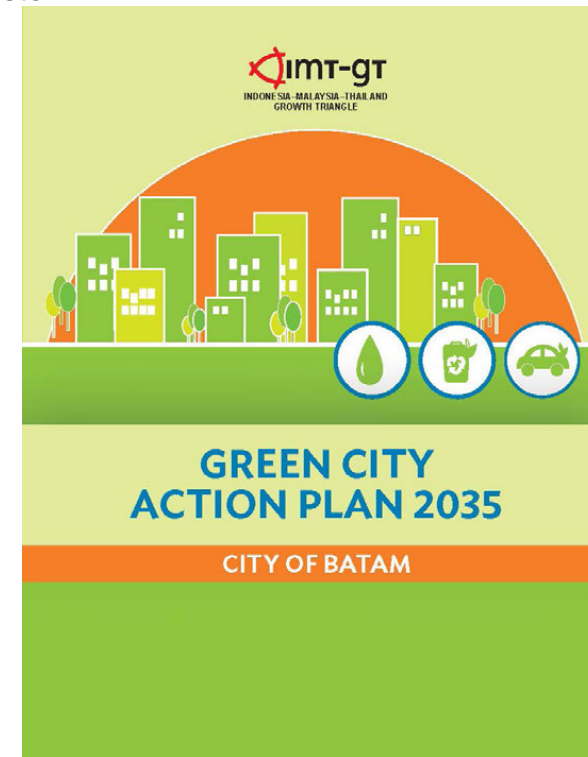
Figure 14. Challenges for Green City Profile of Batam



## The Six Priority Programs

### Green Water, Green Waste, Green Transport

1. Improving Water Quality in Duriangkang Reservoir
2. Improvement of on-site sanitation system in parallel with ongoing wastewater network and treatment project
3. Environmentally Friendly Solid Waste Management System including Waste-to-Energy Plant in Telaga Punggur
4. Development of the “Trans Batam” Bus Rapid Transit System
5. Development of Network of Bicycle Lanes and Footpaths in Batam City
6. Improvement of Urban Drainage and Flood Control System





# Local Climate

Batam [1.1301° N, 104.0529° E] is situated near the equator and has a typically tropical and humid climate. Located just 1 degree north of the equator, it quite naturally enjoys a tropical/equatorial climate. Due to its geographical location and maritime exposure, Batam's climate is characterized by abundant rainfall, high and uniform temperatures, and high humidity all year round.

Many of its climate variables, such as temperature and relative humidity, do not show large month-to-month variation. However, many variables exhibit prominent diurnal (or daily) variations from hour to hour, indicating the strong influence that solar heating has on the local climate. The average temperature is between 26 degrees Celsius and 30 degrees Celsius. Thunderstorms occur on 40% of all days. Relative humidity is in the range of 70% – 80%. April is the warmest month, January is the coolest month and November is the wettest month. Rainfall is almost an everyday phenomenon, even during the non-monsoon period. These brief showers are usually quite refreshing, as they provide respite from the sun.

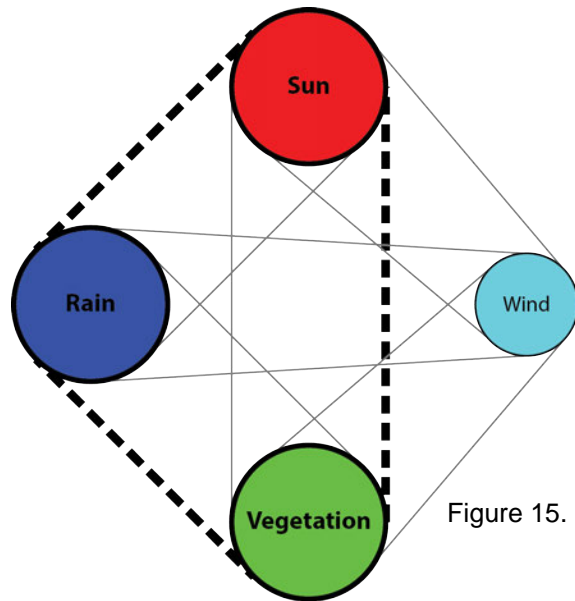


Figure 15. Batam Micro-climate Diagram

As comparison, Copenhagen [55.6761° N, 12.5683° E] that is located up north is in the oceanic climate zone (Köppen: Cfb). The city has a mild temperate, fully humid and warm summer climate. Its weather is subject to low-pressure systems from the Atlantic which result in unstable conditions throughout the year. There are four distinctive seasons, summer, spring, autumn and winter. And wind plays a very important role in shaping the climate, especially during winter time.

Apart from slightly higher rainfall from July to September, precipitation is moderate. While snowfall occurs mainly from late December to early March, there can also be rain, with average temperatures around the freezing point. The average temperature varies between -4 degrees Celsius during winter with low sun angle, and 23 degrees Celsius during summer with high sun angle. Because of Copenhagen's northern latitude, the number of daylight hours varies considerably between summer and winter.

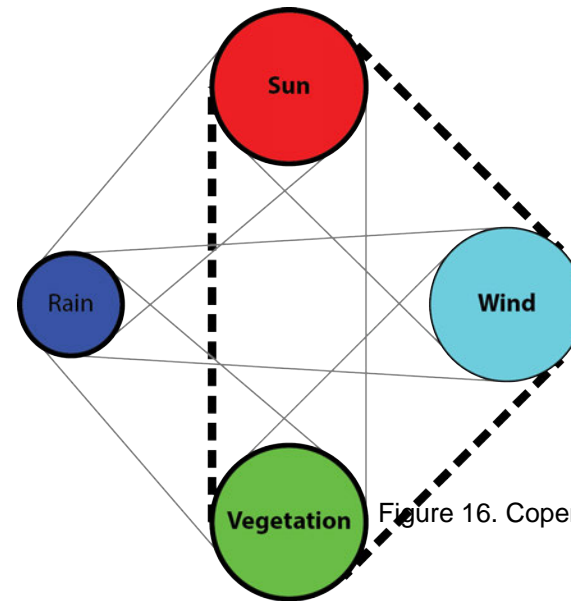
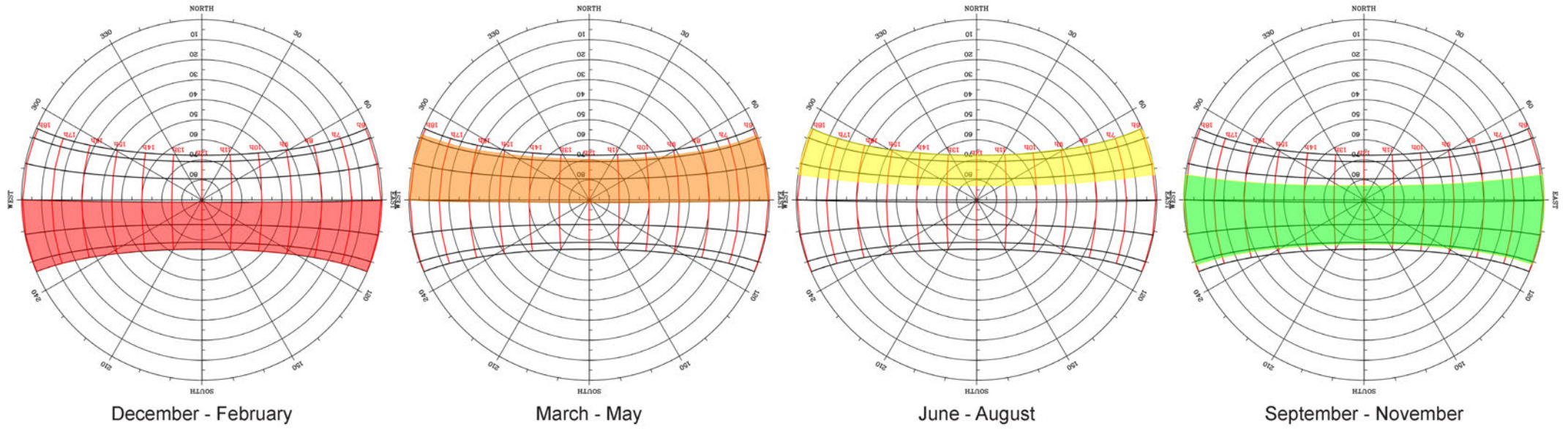


Figure 16. Copenhagen Micro-climate Diagram

# Batam Comprehensive Micro-climate Analysis Matrix

## Batam

### Sun Path



### Vegetation (Tabebuaya Tree and Ketapang Tree)

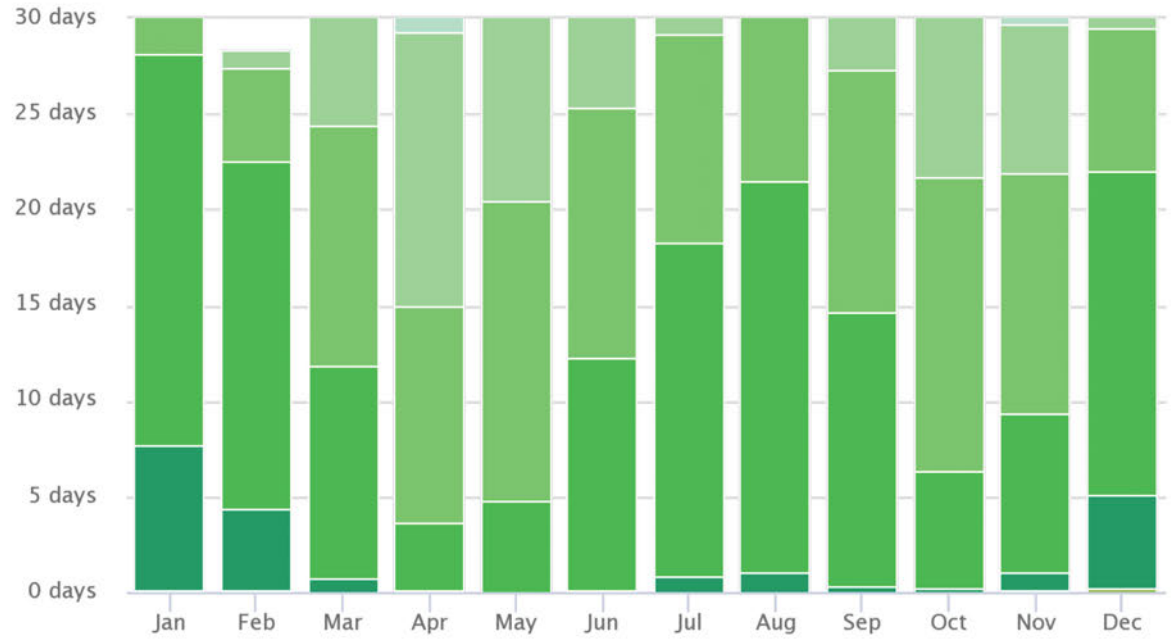
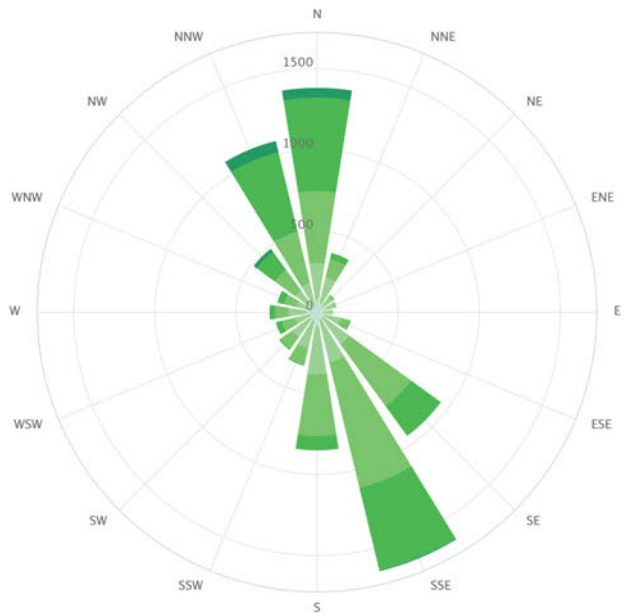


Figure 17. Batam Comprehensive Micro-climate Analysis Matrix: Sun, Vegetation, Wind, and Rain



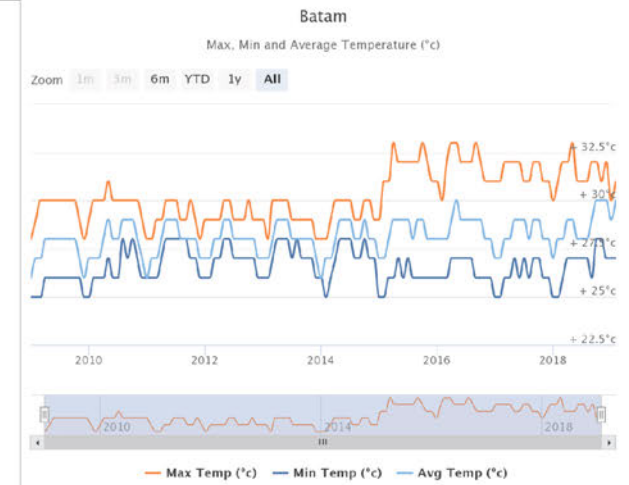
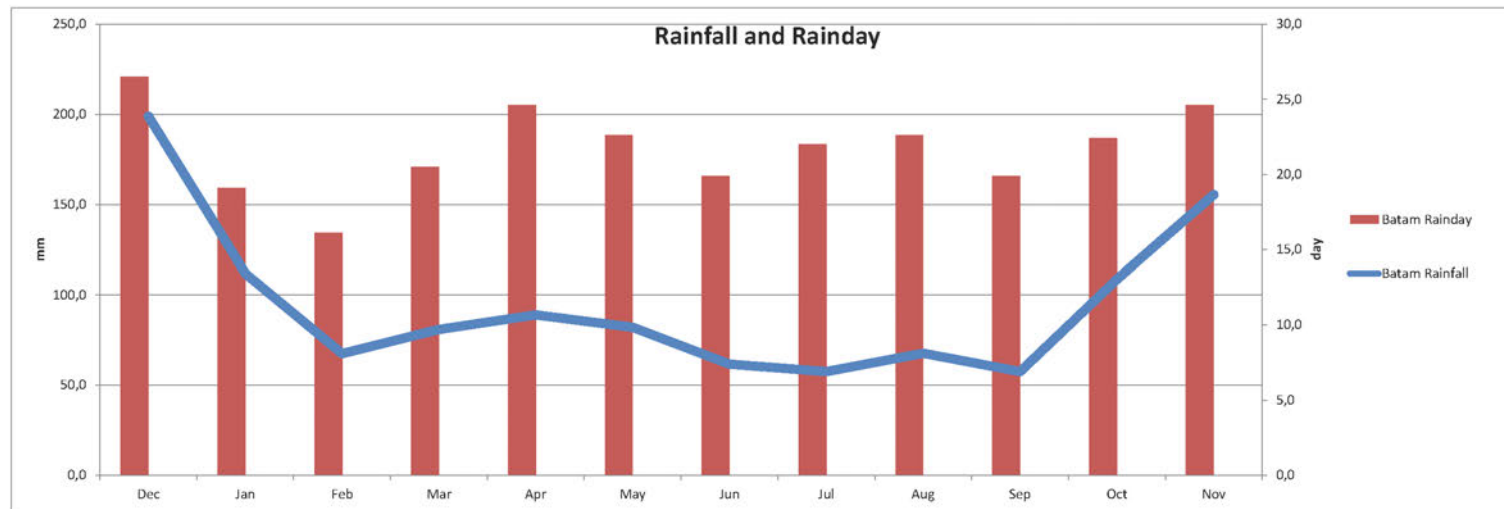
# Batam Comprehensive Micro-climate Analysis Matrix

## Wind



meteoblue

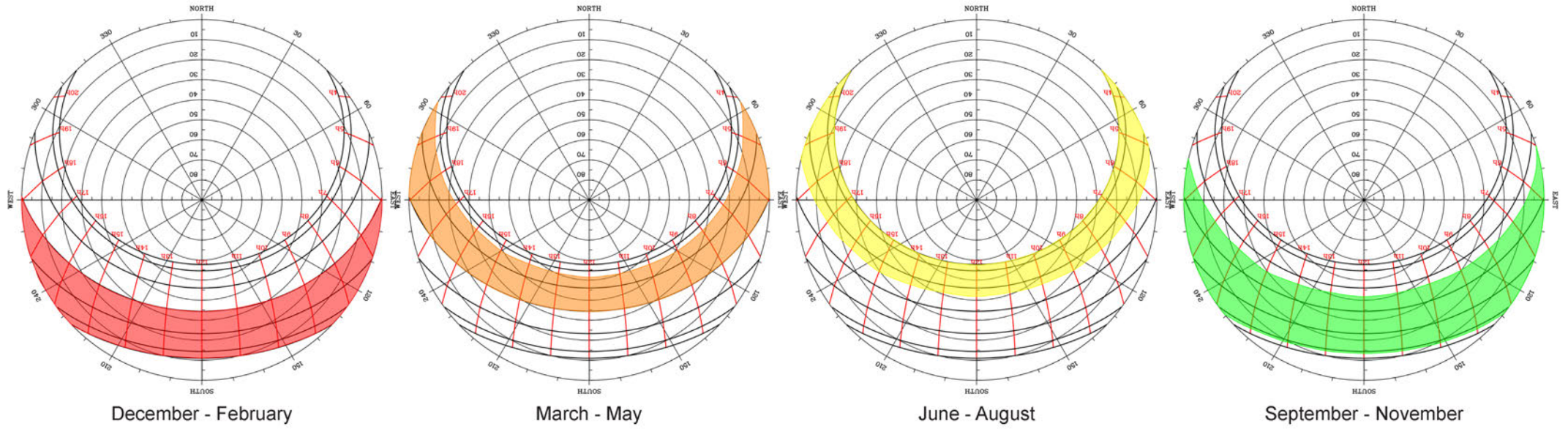
## Rainfall



# Copenhagen Comprehensive Micro-climate Analysis Matrix

## Copenhagen

### Sun Path



### Vegetation (Linden Tree and Pine Tree)

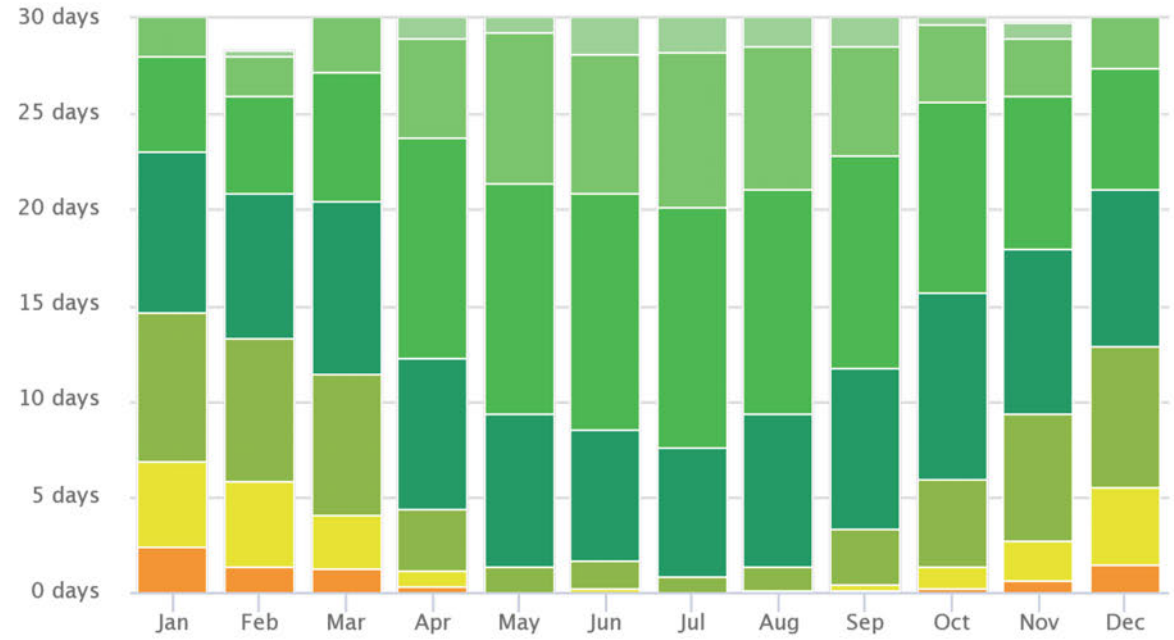
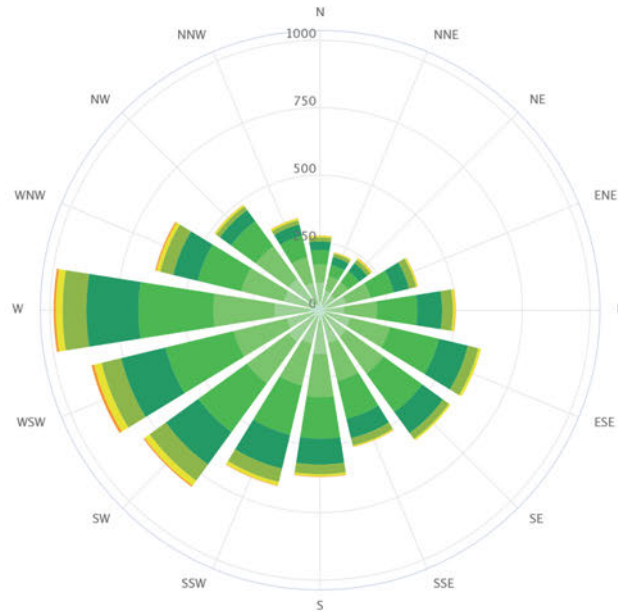


Figure 18. Copenhagen Comprehensive Micro-climate Analysis Matrix: Sun, Vegetation, Wind, and Rain



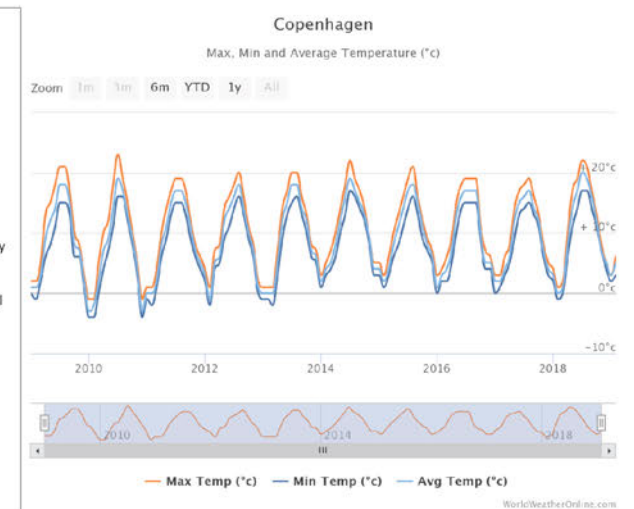
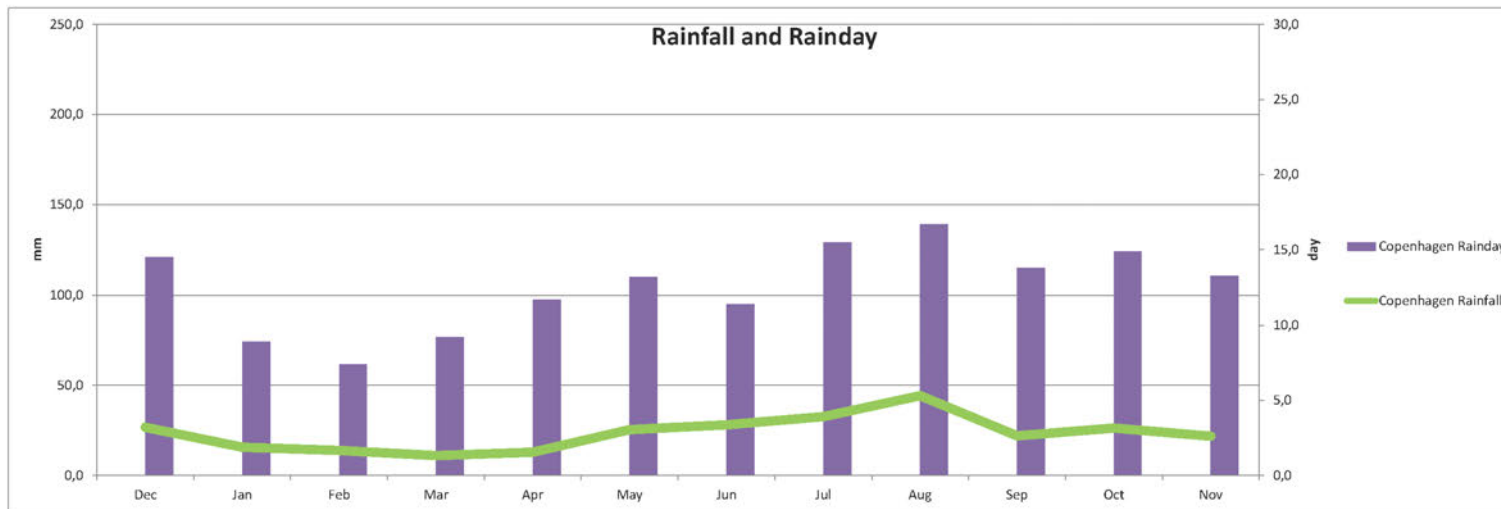
# Copenhagen Comprehensive Micro-climate Analysis Matrix

## Wind



meteoblue

## Rainfall





# Sustainable Urban Vision and Urban Resilience Framework

- The SDGs and The New Urban Agenda

## Urban Resilience Frameworks:

- World Bank
- Asian Development Bank
- 100 Resilient Cities Program, The Rockefeller Foundation
- National Climate Change Secretariat, Singapore



# The Sustainable Development Goals

Today's global community has realized the importance of sustainable city and community issues as a very important problem to solve together. UNHabitat's New Urban Agenda reflects that awareness, as well as the determination of the world community to produce better and more sustainable cities and global communities. The principles of environmental, economic and social sustainability are very relevant for Batam and the SIJORI region in general, considering the many problems that is happening, so it is worth to mention our new urban agenda.

New Urban Agenda, HABITAT III, 2016

The New Urban Agenda presents a paradigm shift based on the science of cities. Connection between the New Urban Agenda and the 2030 Agenda for Sustainable Development, especially Goal 11 on sustainable cities and communities. It consists of:

Quito declaration (175 points) on sustainable cities and human settlements for all

- Our Shared Vision
- Our principles and Commitments
- Call for Action

Quito implementation plan for the new urban agenda

- Transformative commitments for sustainable urban development
- Sustainable urban development for social inclusion and ending poverty  
Sustainable and inclusive urban prosperity and opportunities for all  
Environmentally sustainable and resilient urban development

- Effective implementation

Building the urban governance structure: establishing a supportive framework

Planning and managing urban spatial development

Means of implementation

- Follow up and review



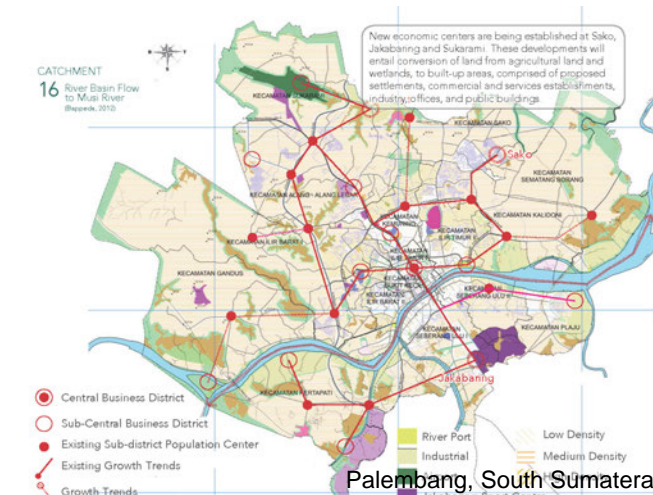
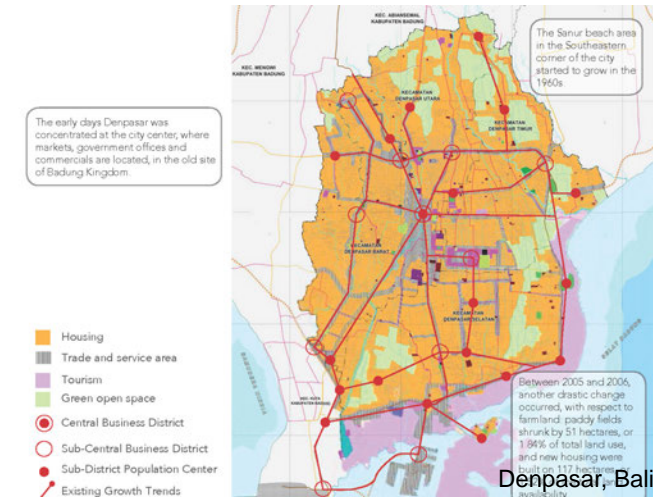
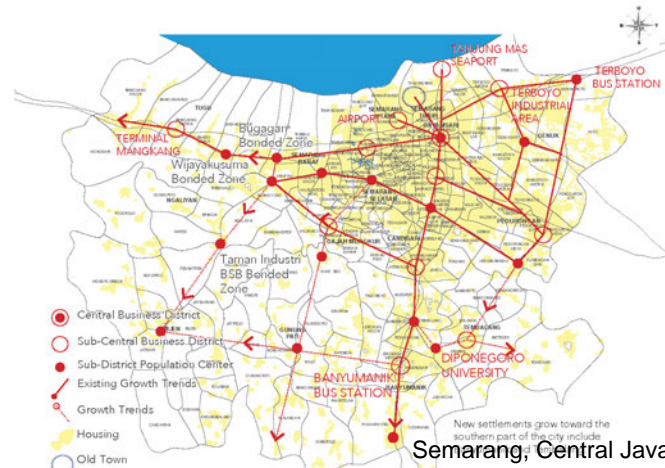
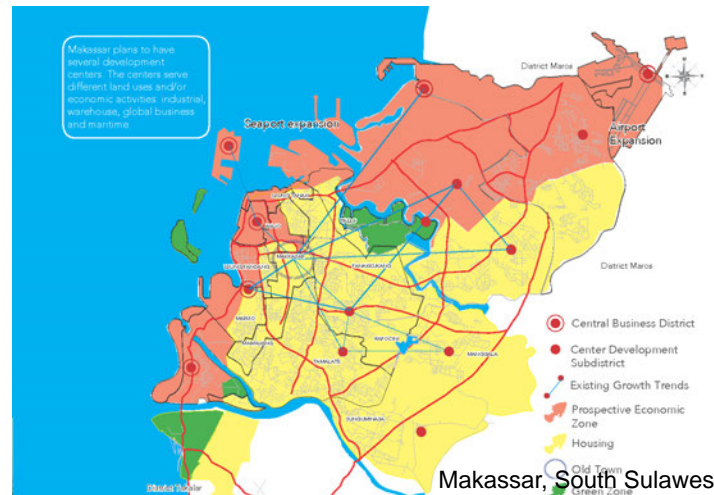
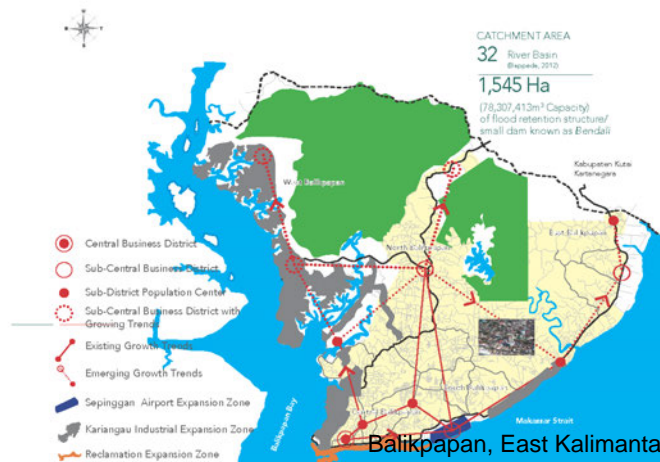
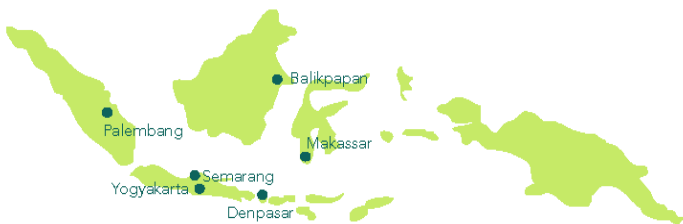
# World Bank

There is also urgent needs of solving resilience-related problem due to the change of nature, namely global warming. Many studies and initiatives from different institutions have been raised to tackle this problem. Some of them have resulted in a good progress, the others is still struggling and developing solutions. Here I mention some of urban resilience frameworks:

## Study form The World Bank

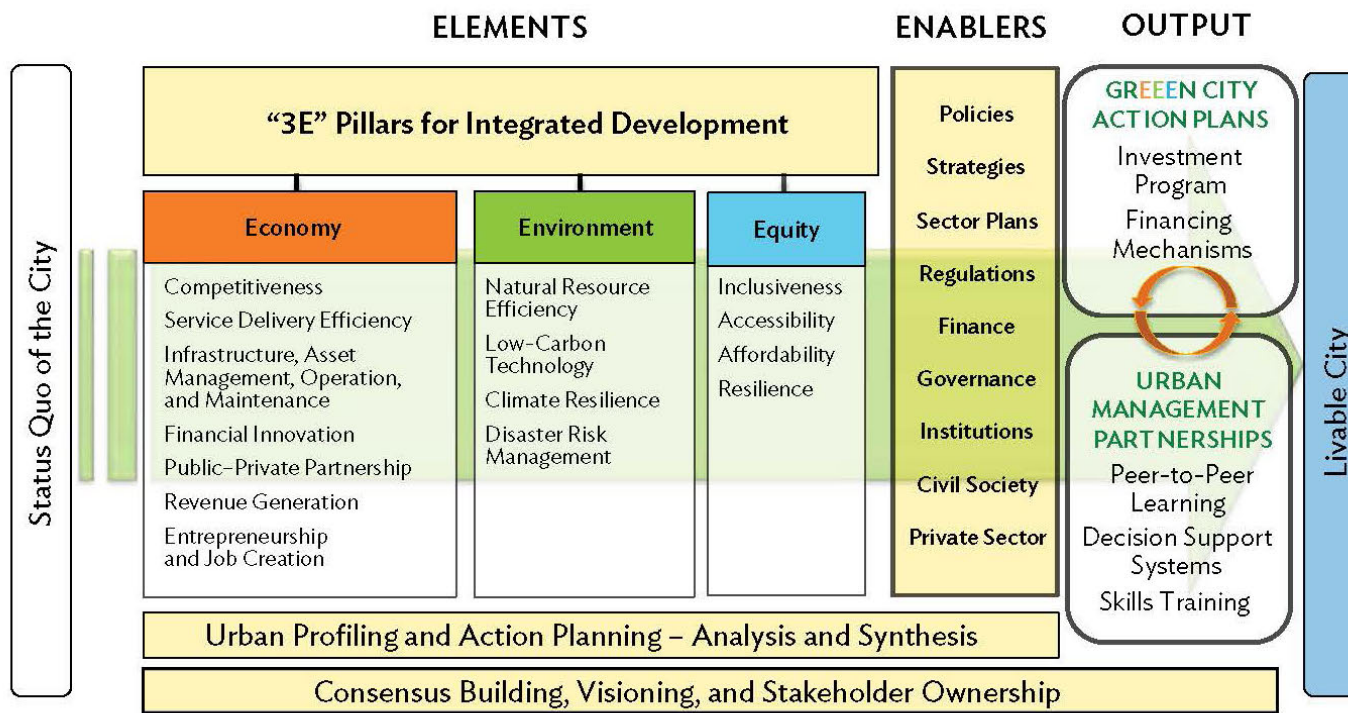
- Building Urban Resilience: Principles, Tools, and Practice, 2013
- City Risk Diagnostic for Urban Resilience in Indonesia, 2015

Rapid risk diagnostics have been carried out in Indonesia in six medium and large cities as a pilot project. The six cities are: **Balikpapan**, **Makassar**, **Palembang**, **Denpasar**, **Semarang**, and **Yogyakarta**.





# Asian Development Bank



3Es = economy, environment, and equity.

Source: S. Sandhu and R. Naik Singru. 2014. Enabling GrEEEn Cities: An Operational Framework for Integrated Urban Development in Southeast Asia. *SERD Working Paper Series*. No. 9. Manila: Asian Development Bank.

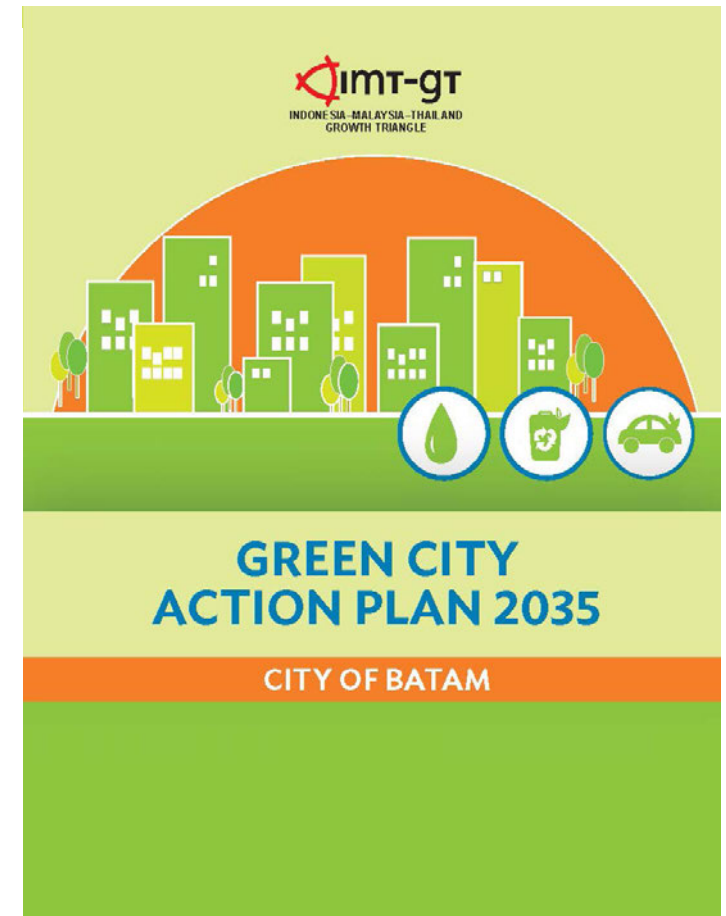


Figure 19. ADB GrEEEn Cities Operational Framework

Study form Asian Development Bank

- Enabling GrEEEn Cities - An Operational Framework for Integrated Urban Development in South east Asia, 2014
- GrEEEn Solutions Livable Cities, 2016

# 100 Resilient Cities Program

Study form NGO, Rockefeller Foundation and ARUP

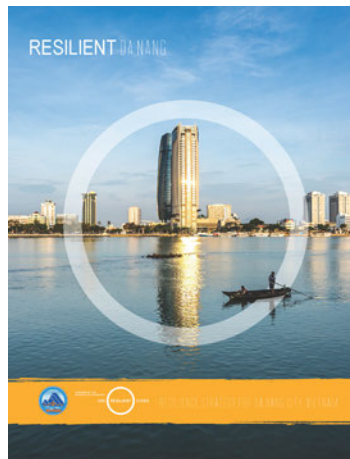
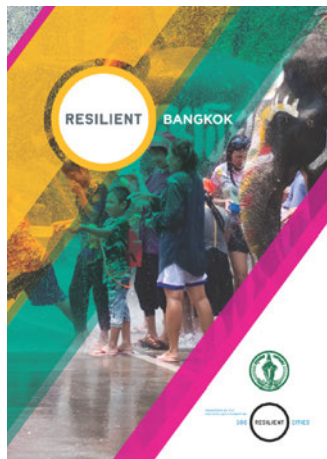
City Resilience Framework, 2015

Resilience Strategy, case studies of similar climatic context cities:

- Bangkok (2017)
- Da Nang (2016)
- Panama City (2018)
- Santiago de Los Caballeros (2018)
- Semarang (2016)
- Singapore (2018)



Figure 20. 100 Resilient Cities Program Resilience Framework



**PANAMÁ  
RESILIENTE**

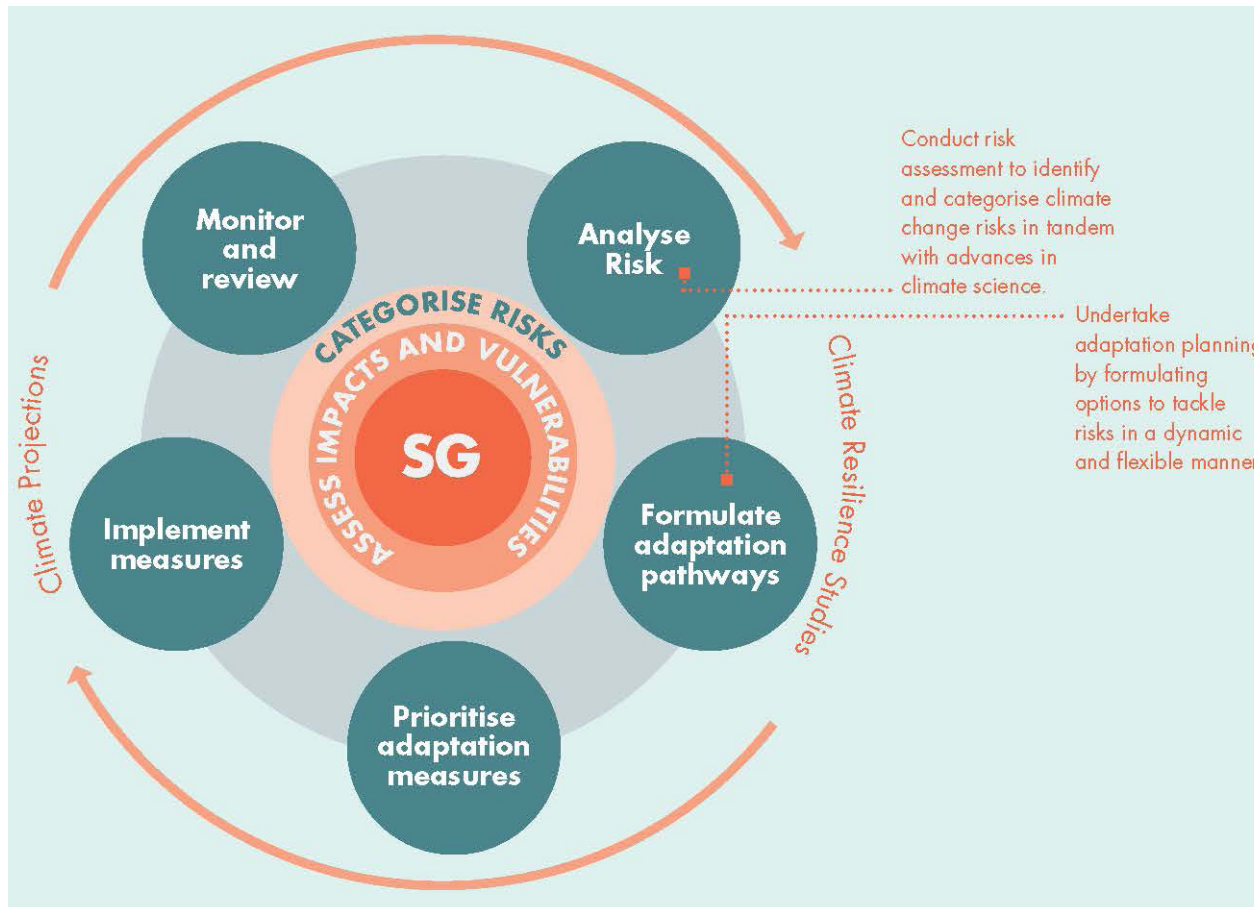




# National Climate Change Secretariat of Singapore

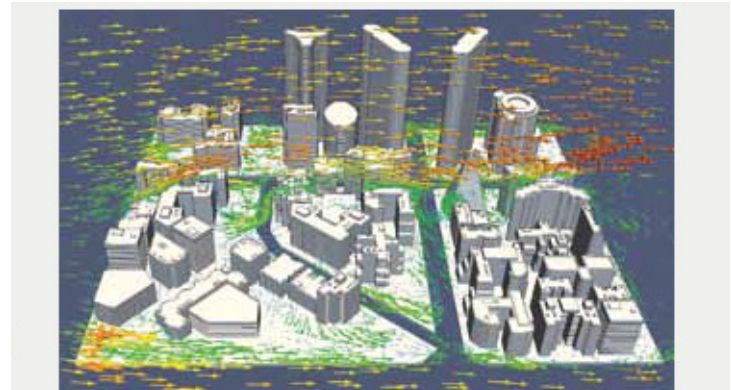
Study and program from Singapore government

- A Climate Resilient Singapore for A Sustainable Future, 2016
- National Climate Change Strategy 2012
- Public Sector Sustainability Plan 2017-2020



Responding climate change effect to the built environment using scientific and technological approach. At building scale by incorporating passive design principle such as building orientation, sun shading and natural ventilation to establish energy-efficient building. Large windows facing prevailing winds and internal layout that optimise airflow can improve ventilation and reduce the need for air-conditioning.

Good wind flow through cities can also help to remove heat built-up and improve air quality and human comfort at larger urban setting. In collaboration with HDB, NUS and A\*STAR's Institute of High Performance Computing (IHPC), The Urban Redevelopment Authority is leading a Climatic Mapping Study to understand how the built environment and presence of urban greenery could affect micro-climatic conditions such as air flow and temperature.



*IHPC's researchers utilised their computational science expertise and the principles of fluid dynamics to accurately model, simulate and visualise wind flow patterns in a city.*

Figure 21. Singapore's Resilience Framework



# Urbanism Paradigm

- Jan Gehl and The Cities for People
- Singapore and “The City in a Garden” Vision
- Melayu Islamic Perspective on Urbanism

View to Singapore in Tanjung Pinggir Beach, Sekupang, Batam



# Jan Gehl and The Cities for People

Perhaps one of the most well-known figure today who represents Scandinavian ideal of urbanism is Danish Architect and Urbanist, Jan Gehl. In his book, *Cities for People*, he wrote about quality criterias for urban public place. It is about taking consideration various factors regarding the pedestrian landscape, from basic protection, opportunities to provide comfort, to the delight of using public space.

Above that, he put very important idea about dealing with urban life by putting into an order of how to plan humanistic place by. It start with understanding urban life, followed by arranging urban space, then configuring the architecture. This sequence of thingking, life-space-build- ing, provide a better framework to ensure humanistic planning quality for city.

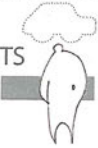











Protection	<p><b>PROTECTION AGAINST TRAFFIC AND ACCIDENTS — FEELING SAFE</b></p> <ul style="list-style-type: none"> <li>• Protection for pedestrians</li> <li>• Eliminating fear of traffic</li> </ul> 	<p><b>PROTECTION AGAINST CRIME AND VIOLENCE — FEELING SECURE</b></p> <ul style="list-style-type: none"> <li>• Lively public realm</li> <li>• Eyes on the street</li> <li>• Overlapping functions day and night</li> <li>• Good lighting</li> </ul> 	<p><b>PROTECTION AGAINST UNPLEASANT SENSORY EXPERIENCES</b></p> <ul style="list-style-type: none"> <li>• Wind</li> <li>• Rain/snow</li> <li>• Cold/heat</li> <li>• Pollution</li> <li>• Dust, noise, glare</li> </ul> 
Comfort	<p><b>OPPORTUNITIES TO WALK</b></p> <ul style="list-style-type: none"> <li>• Room for walking</li> <li>• No obstacles</li> <li>• Good surfaces</li> <li>• Accessibility for everyone</li> <li>• Interesting façades</li> </ul> 	<p><b>OPPORTUNITIES TO STAND/STAY</b></p> <ul style="list-style-type: none"> <li>• Edge effect/ attractive zones for standing/staying</li> <li>• Supports for standing</li> </ul> 	<p><b>OPPORTUNITIES TO SIT</b></p> <ul style="list-style-type: none"> <li>• Zones for sitting</li> <li>• Utilizing advantages: view, sun, people</li> <li>• Good places to sit</li> <li>• Benches for resting</li> </ul> 
	<p><b>OPPORTUNITIES TO SEE</b></p> <ul style="list-style-type: none"> <li>• Reasonable viewing distances</li> <li>• Unhindered sightlines</li> <li>• Interesting views</li> <li>• Lighting (when dark)</li> </ul> 	<p><b>OPPORTUNITIES TO TALK AND LISTEN</b></p> <ul style="list-style-type: none"> <li>• Low noise levels</li> <li>• Street furniture that provides "talkscapes"</li> </ul> 	<p><b>OPPORTUNITIES FOR PLAY AND EXERCISE</b></p> <ul style="list-style-type: none"> <li>• Invitations for creativity, physical activity, exercise and play</li> <li>• By day and night</li> <li>• In summer and winter</li> </ul> 
Delight	<p><b>SCALE</b></p> <ul style="list-style-type: none"> <li>• Buildings and spaces designed to human scale</li> </ul> 	<p><b>OPPORTUNITIES TO ENJOY THE POSITIVE ASPECTS OF CLIMATE</b></p> <ul style="list-style-type: none"> <li>• Sun/shade</li> <li>• Heat/coolness</li> <li>• Breeze</li> </ul> 	<p><b>POSITIVE SENSORY EXPERIENCES</b></p> <ul style="list-style-type: none"> <li>• Good design and detailing</li> <li>• Good materials</li> <li>• Fine views</li> <li>• Trees, plants, water</li> </ul> 

Figure 22: Toolbox: 12 quality criteria concerning pedestrian landscape



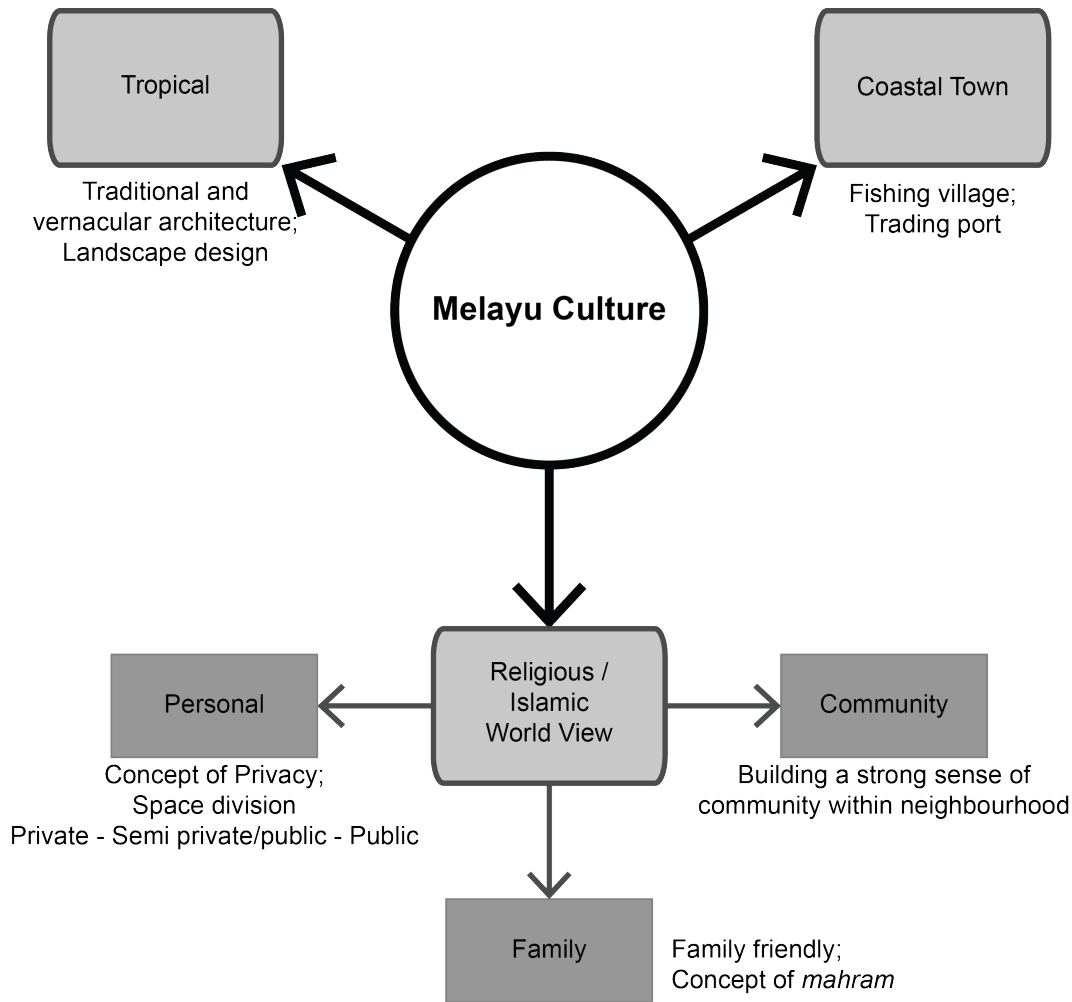
## Singapore, “The City in a Garden” Vision

- The “Garden City” vision was introduced by then Prime Minister on 11 May 1967 to transform Singapore into a city with abundant lush greenery and a clean environment in order to make life more pleasant for the people.
- Over the years, National Parks Board (NPark) mission has evolved from creating a Garden City to creating a City in a Garden.
- Skyrise Greenery Incentive Scheme 2.0 from NPark.
- Landscaping for Urban Spaces and High-Rises (LUSH) Programme: LUSH 3.0 from Urban Renaissance Agency (URA)
- The concept of biophilic design – which seeks to connect or integrate natural elements and living things such as vegetation, flowing water, and sunlight with the built environment - would certainly resonate with many Singaporeans





# Melayu Islamic Perspective



Malay people by its tradition can be characterized by several things. Tropicality is unseparated part of daily life of Malay. In terms of built environment it ranges from traditional and vernacular architecture to urban landscape and small garden. Responding to the climate (sun and rain) as well as local material and craftsmanship are highly valuable part of the culture. From city life tradition, historically Malay civilization spread along the coastal area in form of coastal towns as fishing villages or trading ports. These networks of coastal towns can be found widely in an archipelago, known as Nusantara, in today's Southeast Asia.

This spread of coastal towns and economic relations is also followed by the spread of Islam, initially through trade and followed by the emerge of many Sultanates in the archipelago. And Islamic values and order have been shaping this region and these people for centuries up until today.



Malay people in traditional suit

Figure 23. Melayu Culture Diagram

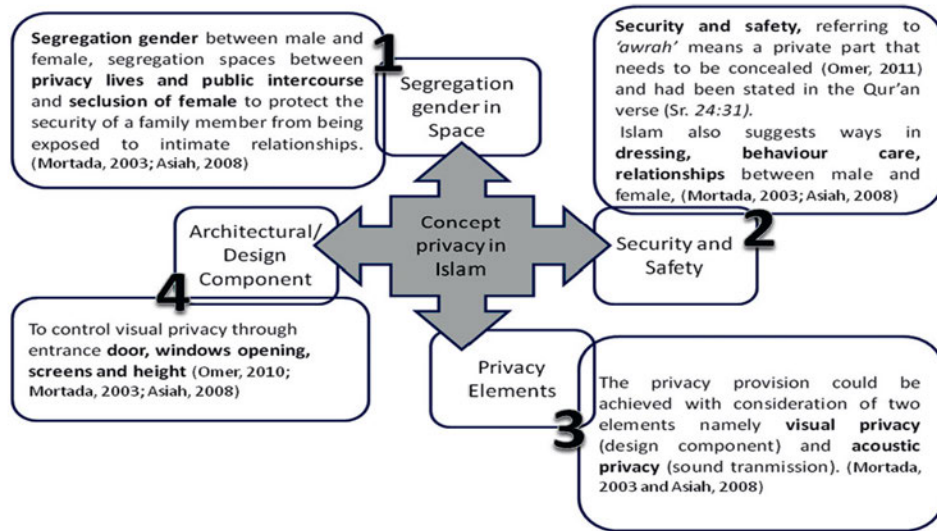


Figure 24. The Concept of Privacy that Follow Islamic Values

One important idea that is derived from islamic value is the concept of privacy. It is about configuration of space into public, semipublic, semiprivate, and private space according to islamic law. Space should be separated based on gender and family relation to ensures privacy, and it is applied to visual and acoustic privacy.

There are many academic studies, especially in Malaysia, that try to improve people's life quality by advocating islamic approach for developing built environment and housing. In Indonesian side many mosques and other religious function building are built because of their important role in community life, and we can use them as a starting point to develop further an islamic value-based built environment.

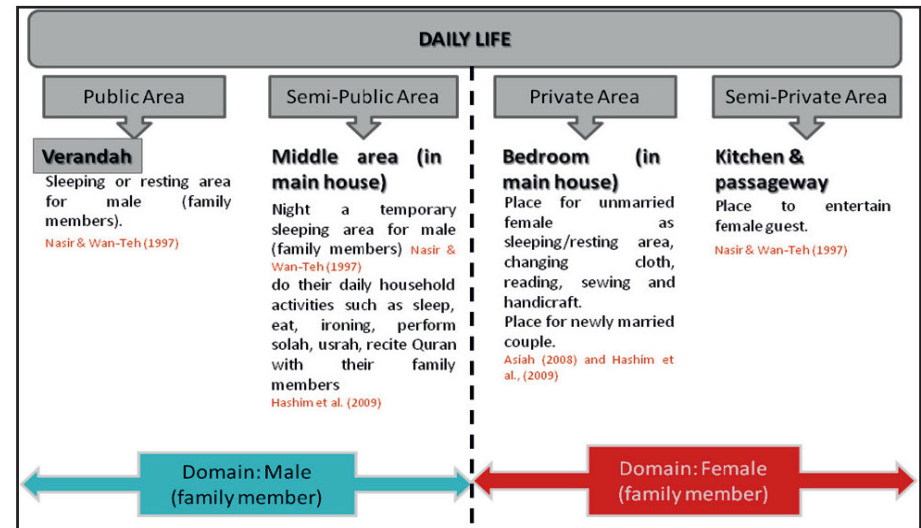


Figure 25. Zoning of Public, Semi-public, Semi-private and Private Spaces following Islamic Principles

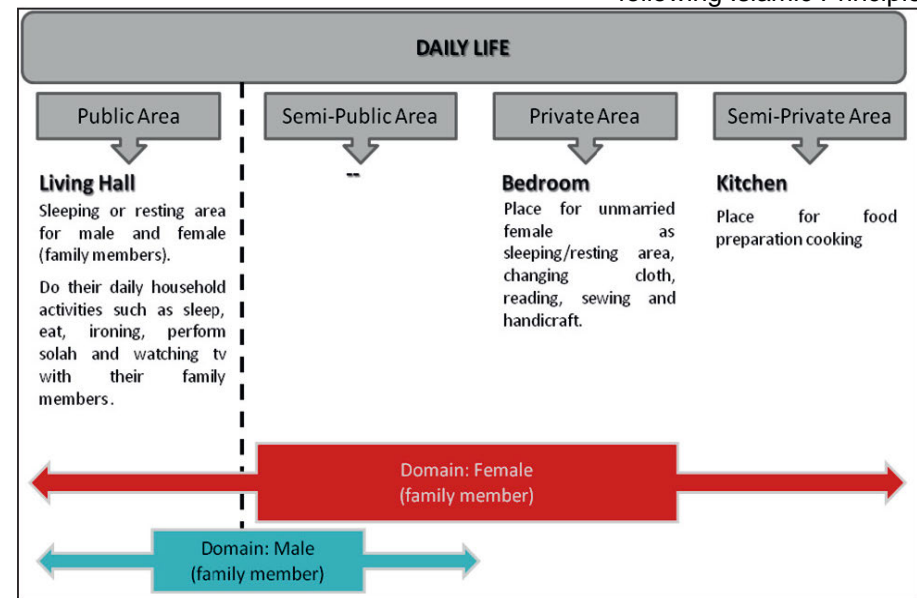


Figure 26. Zoning of Public, Semi-public, Semi-private and Private Spaces NOT following Islamic Principles



## Design Context

- Site Analysis
- Urban Development in Local Context
- Typology Study



# Site Analysis

Dense Housing Area

Ocarina Amusement Park

The design site is located at the heart of Batam in Batam Centre District. International ferry terminal provide direct connection to Singapore and Malaysia through water access. A lot of urban facilities and amenities are within close distance, enriching the urban life around the site with various activity and culture. Government administration offices are centrally located at the surrounding as well as many public gathering place such as grand mosque and convention center.

With this centrality, the design proposal can be the bridge to link international public life with local and traditional life of Batam's communities, creating distinguish Indonesian taste of cultural experiences, like no other area in SIJORI Region.

Sebakau Besar Island

Batam Centre

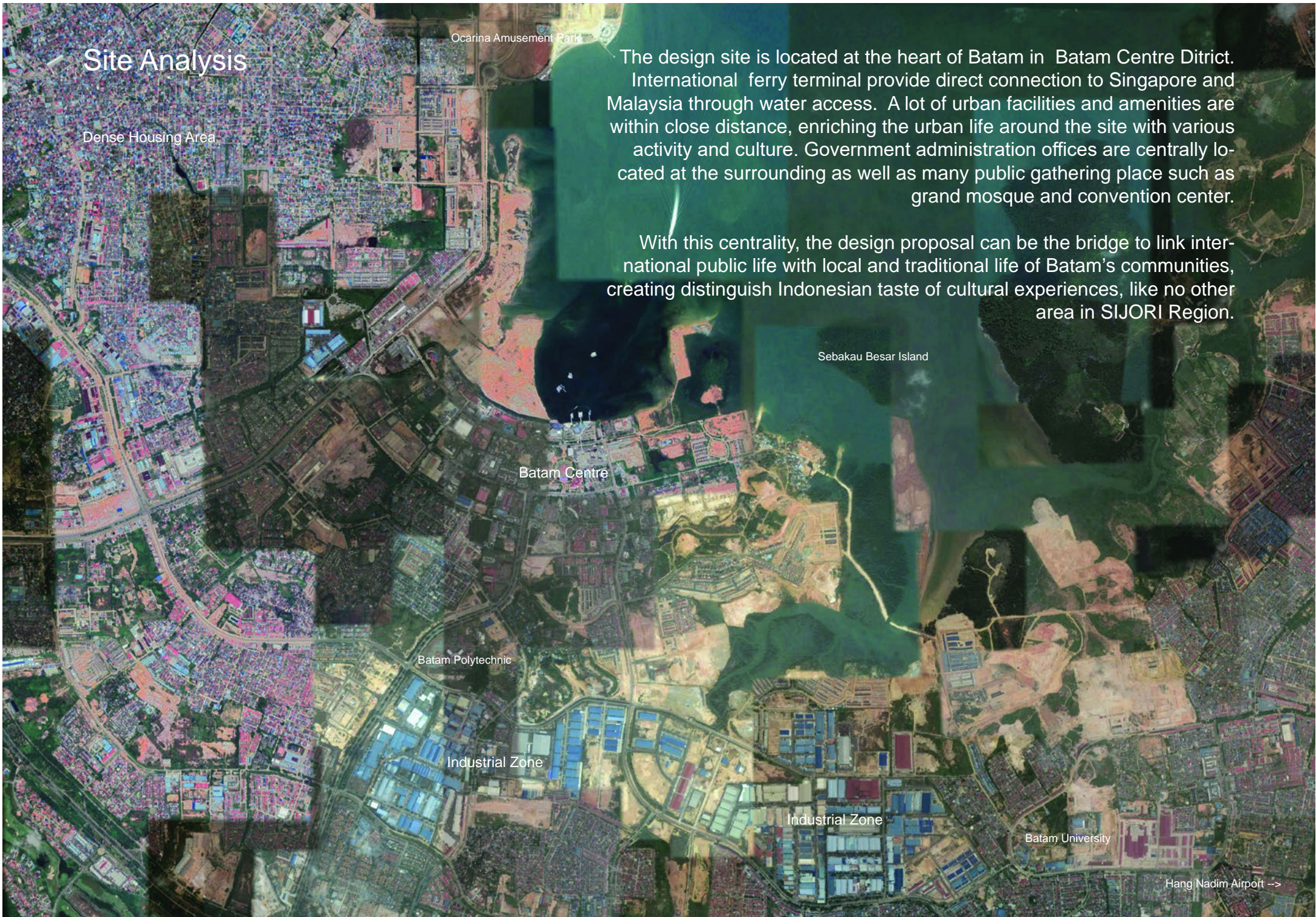
Batam Polytechnic

Industrial Zone

Industrial Zone

Batam University

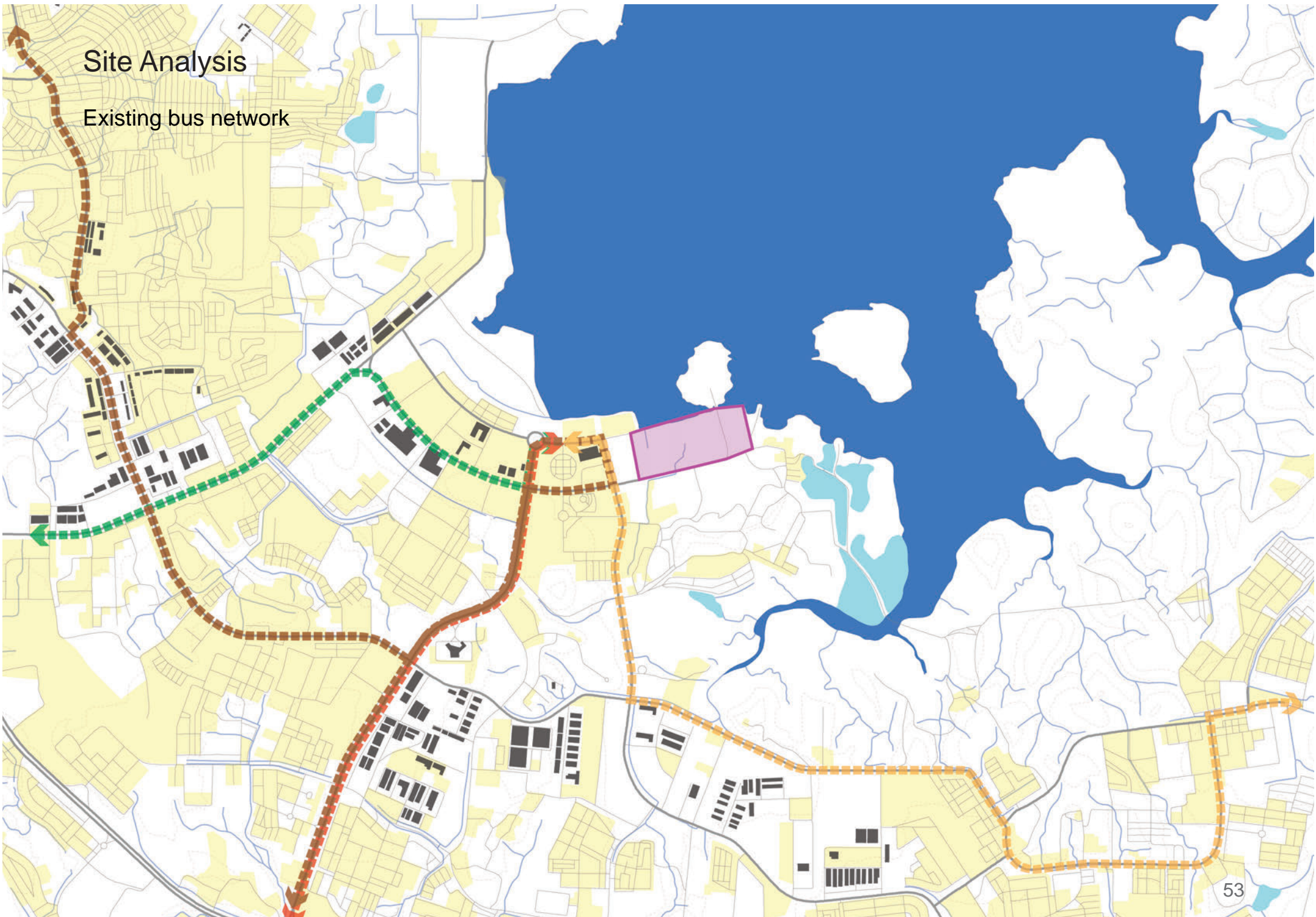
Hang Nadim Airport -->





# Site Analysis

Existing bus network





# Site Analysis

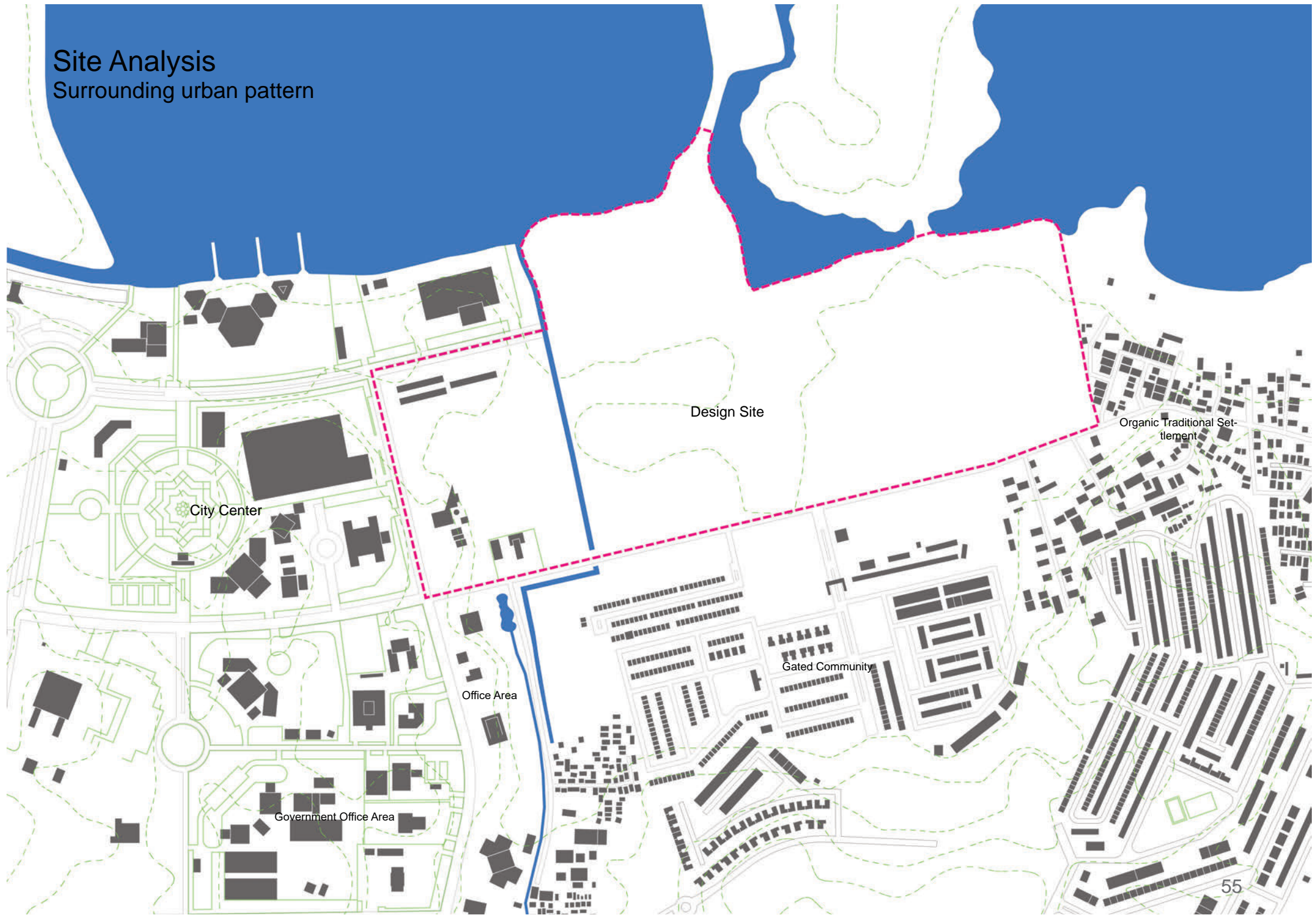
## Site orthophoto





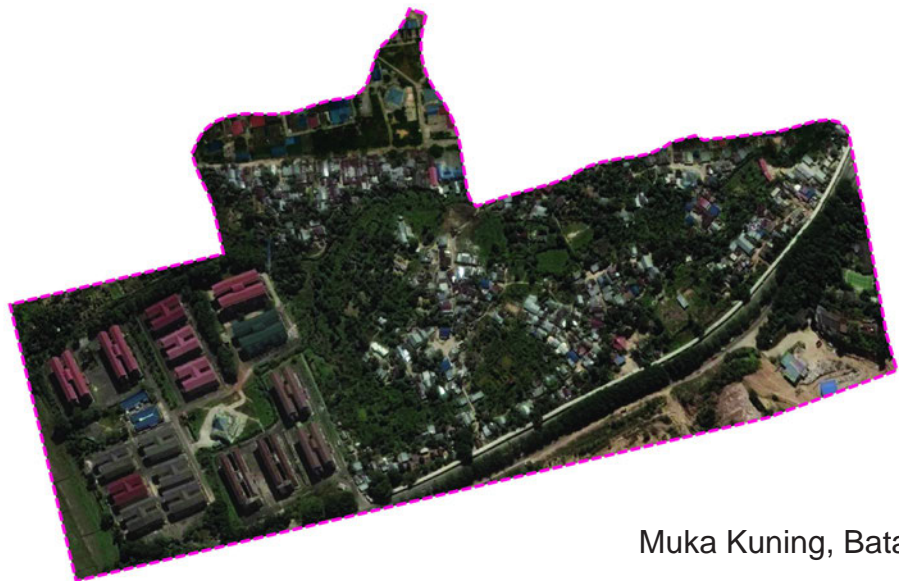
# Site Analysis

## Surrounding urban pattern





Site Scale



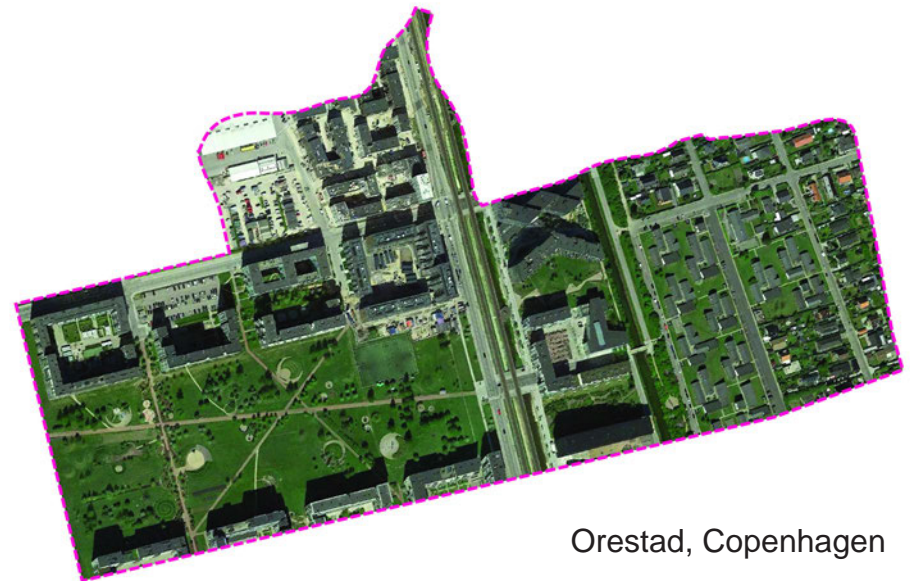
Muka Kuning, Batam



Batamindo Industrial Park



Bo01, Malmö



Orestad, Copenhagen



# Urban Development in Local Context

## Local Authorities Perspective

- In 2018 Batam (through Batam Municipality), Perumnas, BP Batam (Batam Development Authority), BPJS Ketenagakerjaan, Real Estate Indonesia) has built 73 twin block of rental apartment, containing 6820 units, 35 of which (2661 units) under management of Batam Municipality.
- Study in 2009 reveals that Batam needs 756 twin blocks of rental apartment, especially for low income group.
- Local authority relies on financial support from central government to develop housing area.





## Private Developer Perspective

- The national/local developer companies try to explore regional market opportunity by creating many large scale projects, mainly targeting international buyer



Nuvasa Bay Resort, Nongsa Batam. Source: nuvasabay.com



CitraLand Megah, Batam. Source: citrilandmegahbatam.com



Citra Plaza Nagoya, Lubuk Baja. Source: citraplazanagoya.com



- Meisterstadt Masterplan -



Pollux Habibie Center. Source: meisterstadt.com





Sekupang Public Housing



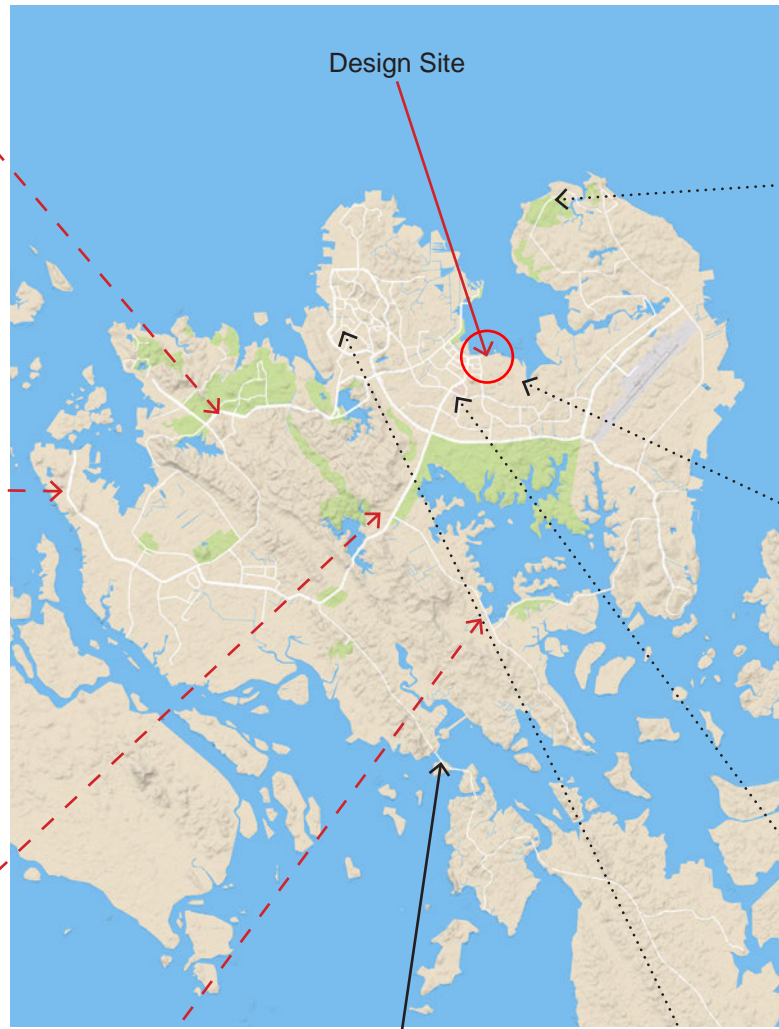
Tanjung Uncang Public Housing



Mukā Kuning Public Housing



Tanjung Piayu Public Housing



Design Site



Nuvasa Bay, Nongsa



CitraLand Megah



Habibi pollux Center



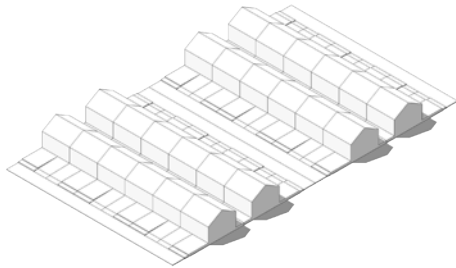
Barelang Bridge



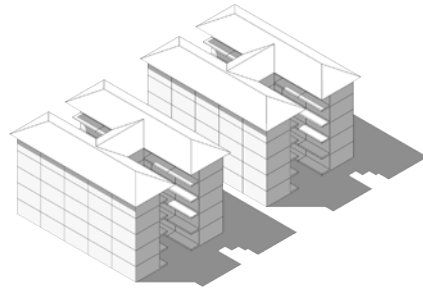
Citra Plaza Nagoya



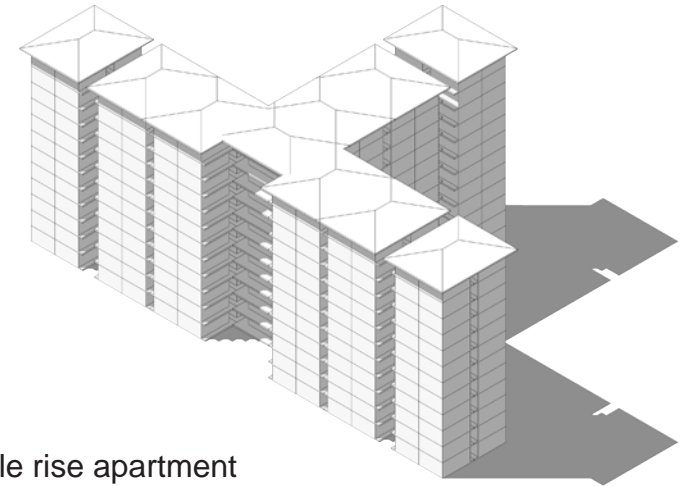
# Typology Study



Row house



Walk up apartment



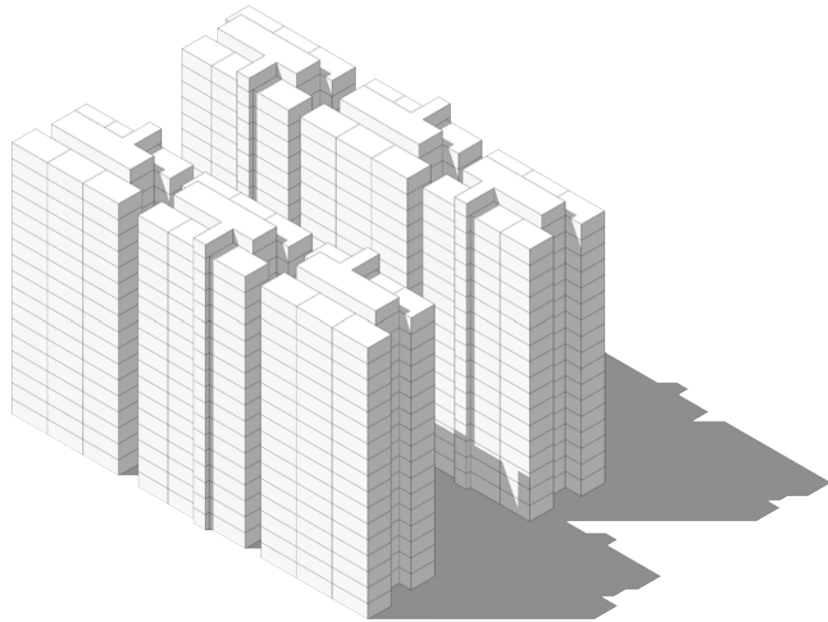
Middle rise apartment

Variations in building typologies reflect differences in the urban environmental, economic and social conditions. Typical buildings within the SIJORI region show a significant difference in the differences in the daily lives of Batam, Johor Bahru and Singapore.

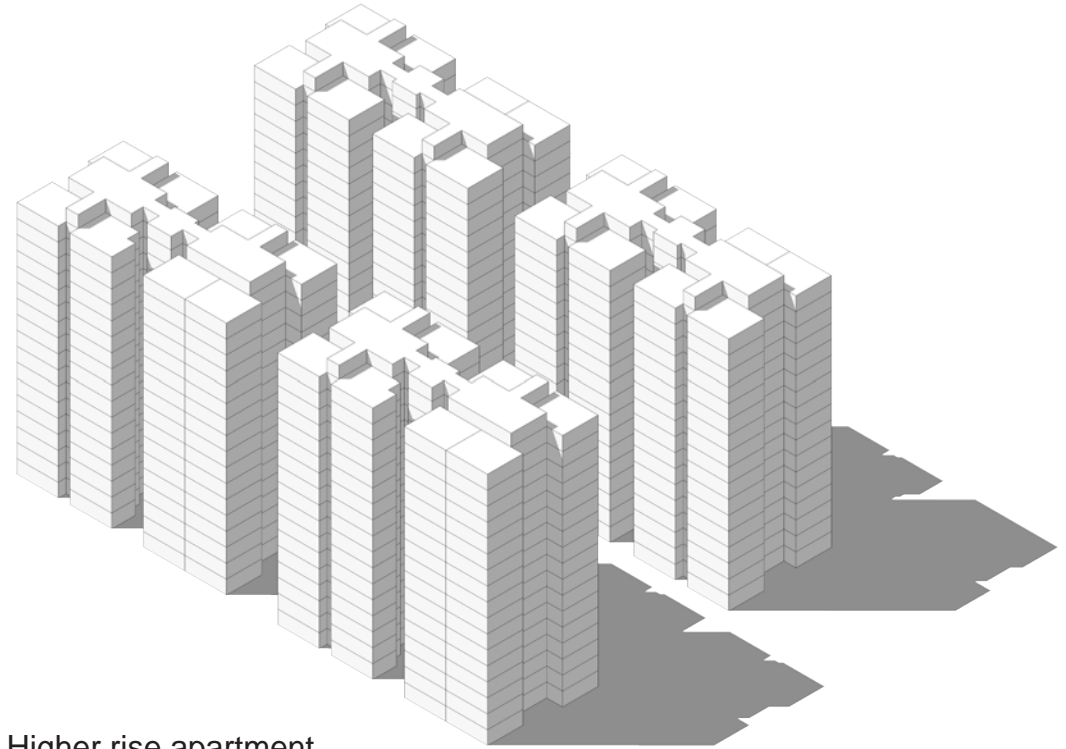
Batam is dominated by horizontal row housing. Urban sprawling grows in the form of exclusive residential communities or gated community built by developers, spreaded in the city. Typologies like this have spatial patterns that tend to be monotonous and divided according to the layout of the built environment. This pattern is also very burdensome to the city because the population becomes dependent on the use of private vehicles. The initiative to build flats from the government, especially for low-income communities, provides a different typology for Batam. The walk up apartment building usually consists of a 5-story building without elevators. Ground floor is provided for public functions and parking. Population density can be increased, but public transportation mode services are not optimal and usually these types of residential projects are in relatively remote areas considering lower land costs. As a result, the lives of residents of flats become relatively difficult to develop.

In Johor Bahru, through the “Prumah Rakyat Project” program (People’s Housing Project) from the central government, several new vertical residential areas can be built. A typical building that was developed has a height of 12 floors targeting residents of middle to lower income. This project can be seen as a form of development from a typical public housing in the previous era in the form of a 5-story building. But Johor Bahru still faces a problem similar to Batam with the reliance on private vehicles due to inadequate public transport facilities.





Higher rise apartment



Higher rise apartment

In Singapore, the evolution of urban development is carried out and controlled carefully through central government institutions. City transportation infrastructure is developed through transit-based concepts from the beginning of regional development so that a more organized built environment can be produced with a much higher population density, especially compared to Batam and Johor Bahru. New smaller towns in Singapore are generally developed with a superblock pattern that is supported by train and bus modes. The diversity of functions was introduced into various regions, especially in the transportation node, giving birth to new activity centers that not only piled up in the city center.



# Design Proposal

- Transformation Concept
- Design Concept
- Site Plan
- Detailed Plan

WELCOME TO BATAM

View from Grand Mosque Courtyard

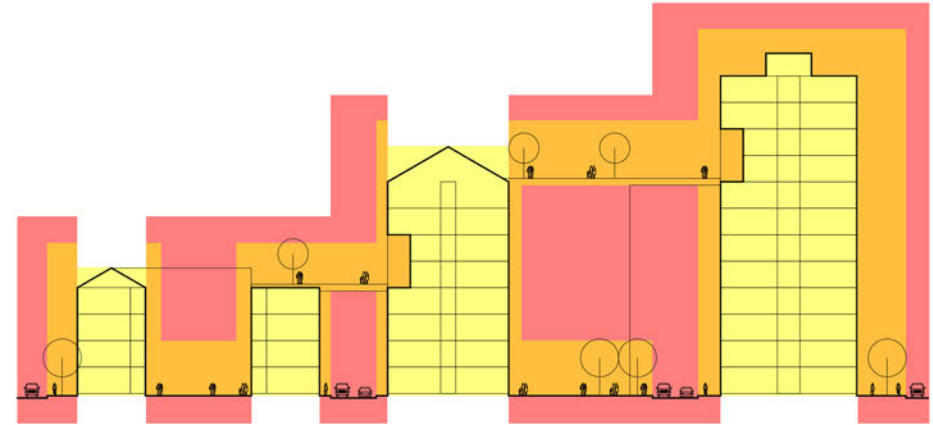


# Transformation Concept

The design proposal aims to transform the urban life in Batam. First strategy by increasing urban density through vertical design with careful attention to local privacy preferences. In effect, it will change today's linear and horizontal pattern of space (public, semi-public, private) into more diverse variation of space concerning public, semi-public, semi-private, and private division of space. On the conceptual diagram you can see this space arrangement in color code, yellow (private), orange (semi-public or semi-private), and red (public).

## Managing Privacy

- Gradual change level of privacy
- Horizontal and vertical division



Second strategy is by reconfiguring the landscape elements of the site, namely the green and the blue. Micro-climate is one of the basic consideration that to deal with direct sunlight in outdoor space we need to provide shading. The old practice of putting stormwater line in the backyard is not beneficial except for the easement of drainage management alone and detach the water from any potential usage. By combining the green and the blue which is very essential to the landscape context, and by accumulating these elements to the building frontage, it can give citizen an alternative comfortable gathering place while also improving the environmental services.

## Reconfiguring Green and Blue

- Accumulating blue and green to create new ecosystem
- New public space under tree canopy area

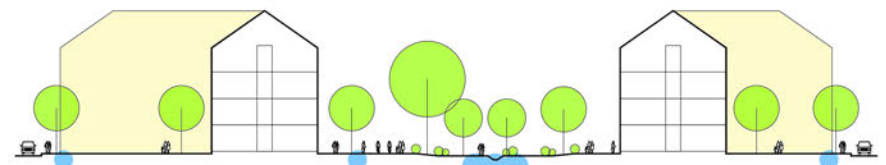
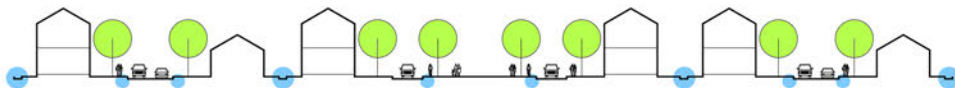


Figure 28. Transformation Concept Diagrams



## Design Concept: Life

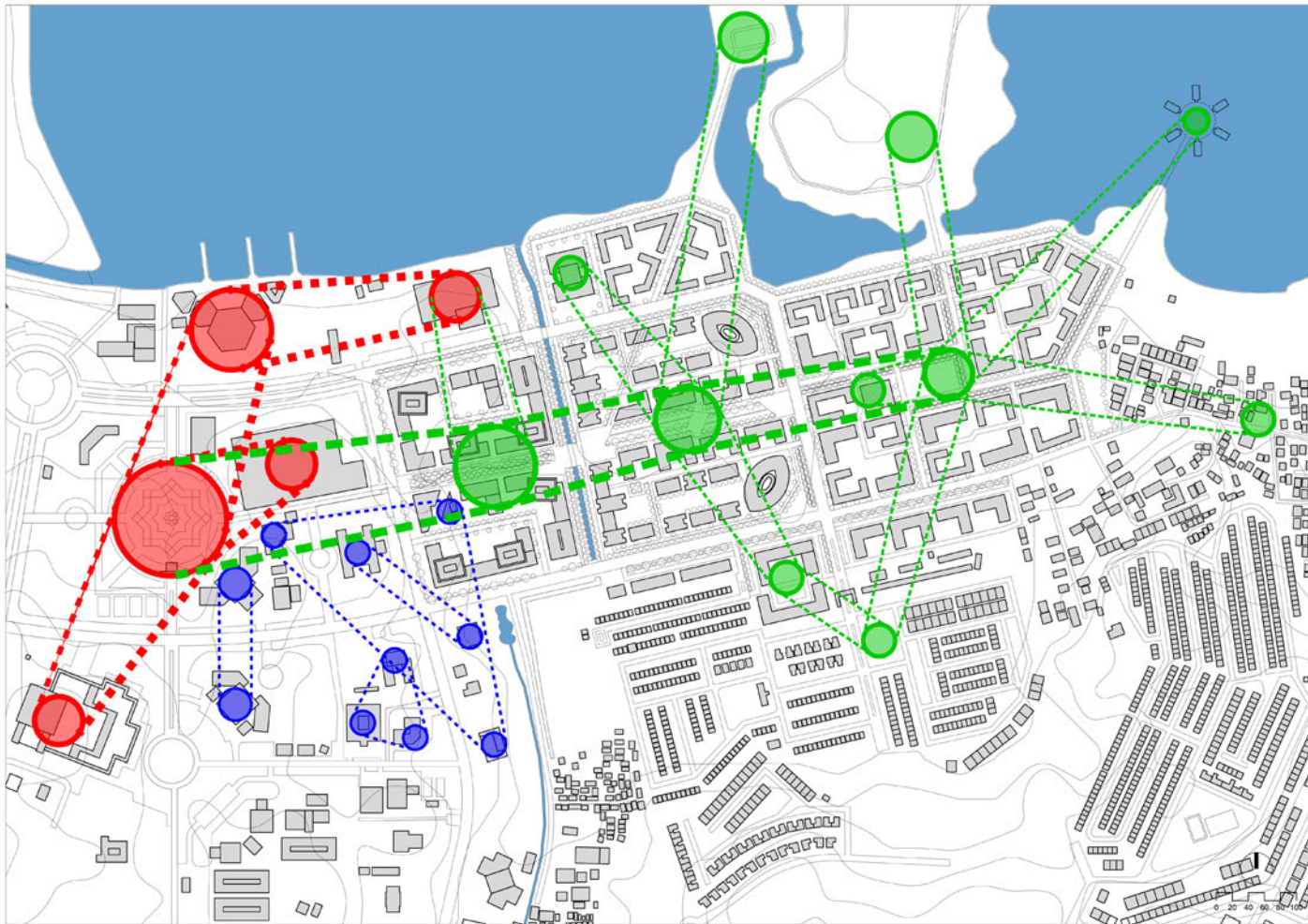


Figure 29. Design Concept: Life - Generating New inter-connected Community

### Life

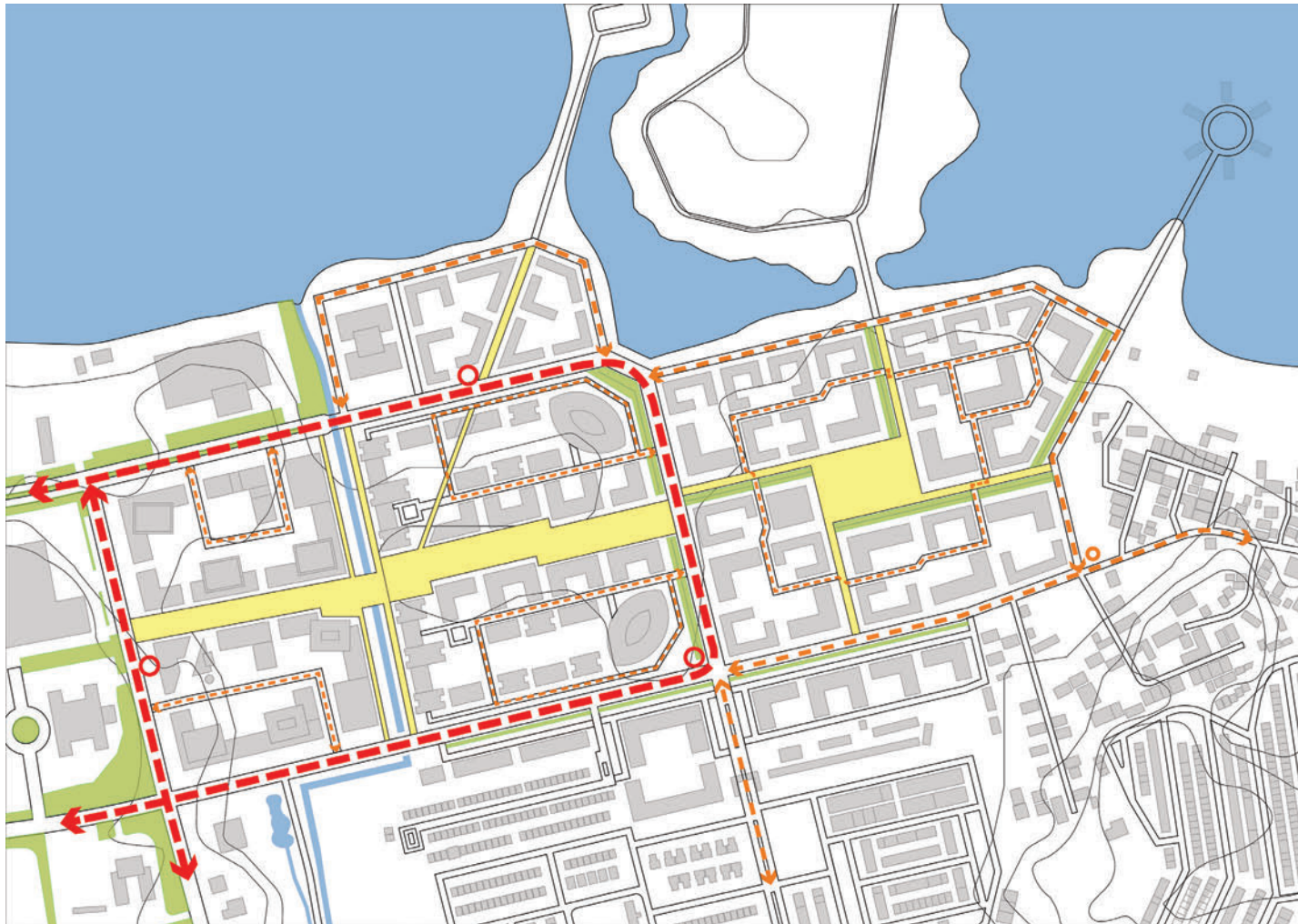
Generating new interconnected community.

First by understanding existing urban life. Red circles represent existing public life, consisted of urban square, international ferry terminal, shopping mall, grand mosque, and convention center as the generators. Blue circles show different government offices as this area has a function of administration center.

This proposal tries to add new life (showed in green) that is linked closely to existing life and neighbourhood. Connecting life in city's public space to surrounding gated communities and organic settlements and create a coherent yet diverse lively communities of Batam.



## Design Concept: Space



### Space

Accessibility for all.

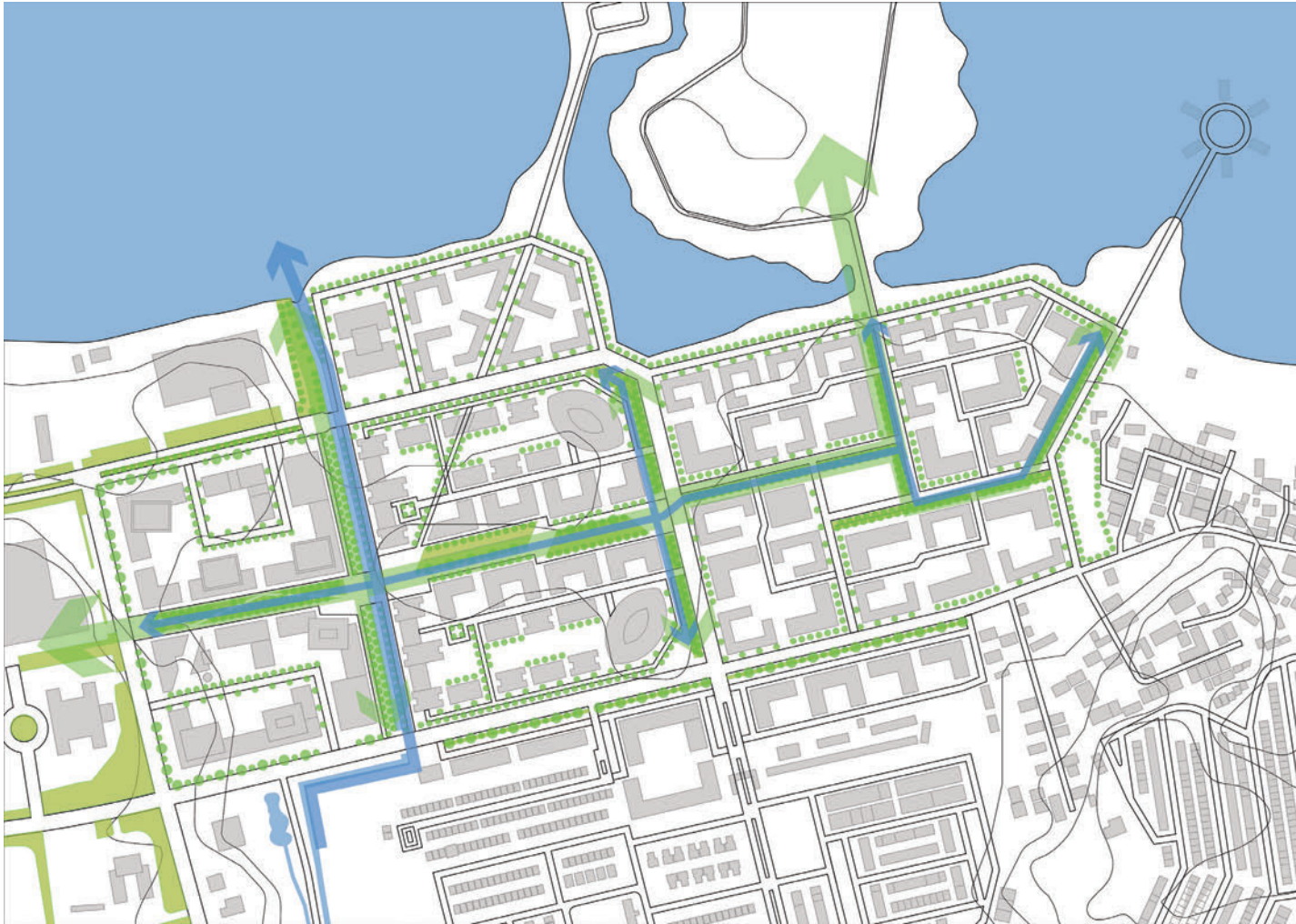
Creating outer loop for bus-based public transportation (red dash) and secure middle area for continuous pedestrian and bicycle path from city square to the east (yellow area). Street layout is formed by connecting existing street which will enhance connectivity with the surroundings.

Local vehicular access (orange dash) is available separated and hidden from main pedestrian boulevard. They serve different functions in each zones with minimum interruption to pedestrian area, and connected to centralized parking facility.

Figure 30. Design Concept: Space - Accessibility for All



## Design Concept: Space



### Space

Interweaving blue and green.

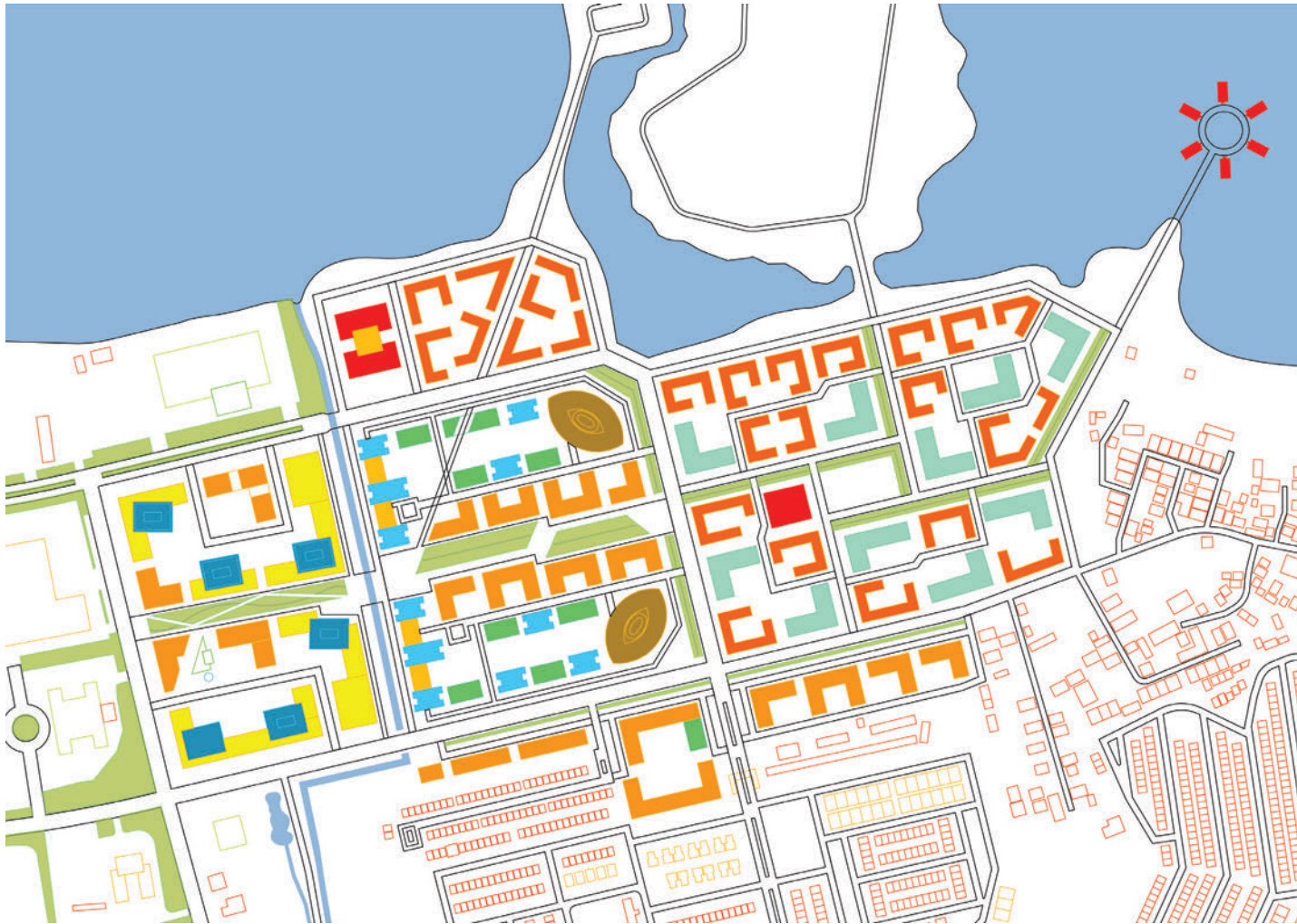
Space for nature is crucial as the nature is a very important assets to the site. It provides unique character of the site which is abundant natural amount in the city center compared to Singapore and Johor Bahru.

There are several main axis of green, blue, and combination of both. Main west-east pedestrian axis is paralleled with bloom rain garden function to provide added ecological value. Water lines give guidance to other natural attractions, the beach and the mangrove island. Dense green shade the public space and creates better micro-climate in the tropical context.

Figure 31. Design Concept: Space - Interweaving Blue and Green



## Design Concept: Building



### Building

Diverse densification.

Basically the site is divided into three zones with different main functions. West part is more for business area with many offices mixed with some commercial and hotel. Middle section is for mixed residential area targeting higher-end market. East side is allocated for mainly social housing function, with local plaza as community activities venue.

Building typology also plays an important role. Each zone is designed to have combination of different building typologies to add diversity of architectural form, public space hierarchy, social group, and economic activity.

Figure 32. Design Concept: Building - Diverse Densification



# Site Plan





# Aerial Perspective



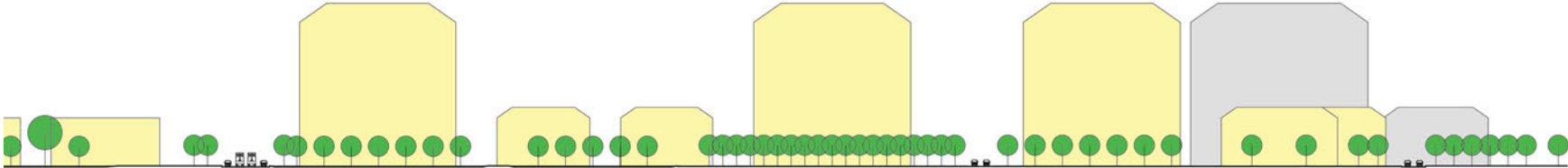


# Site Long Section



CBD Zone	Mixed Residential Zone
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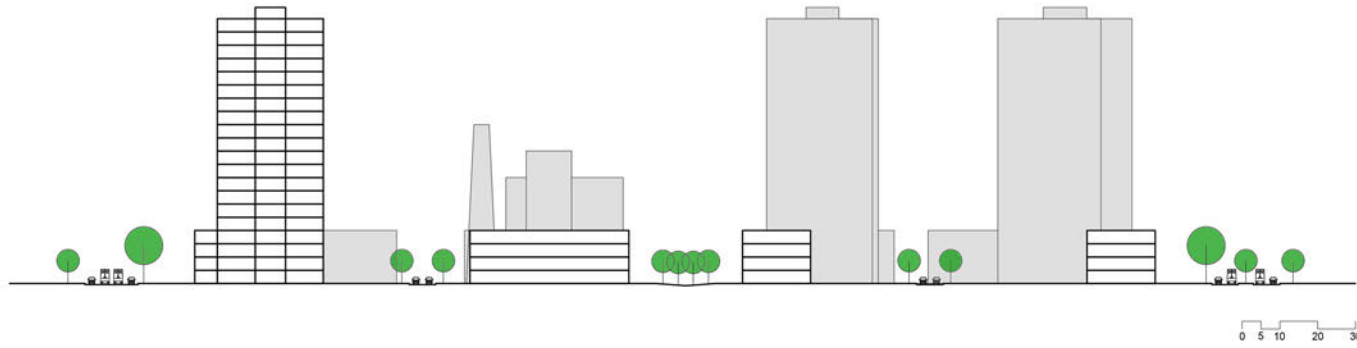




Social Housing Zone

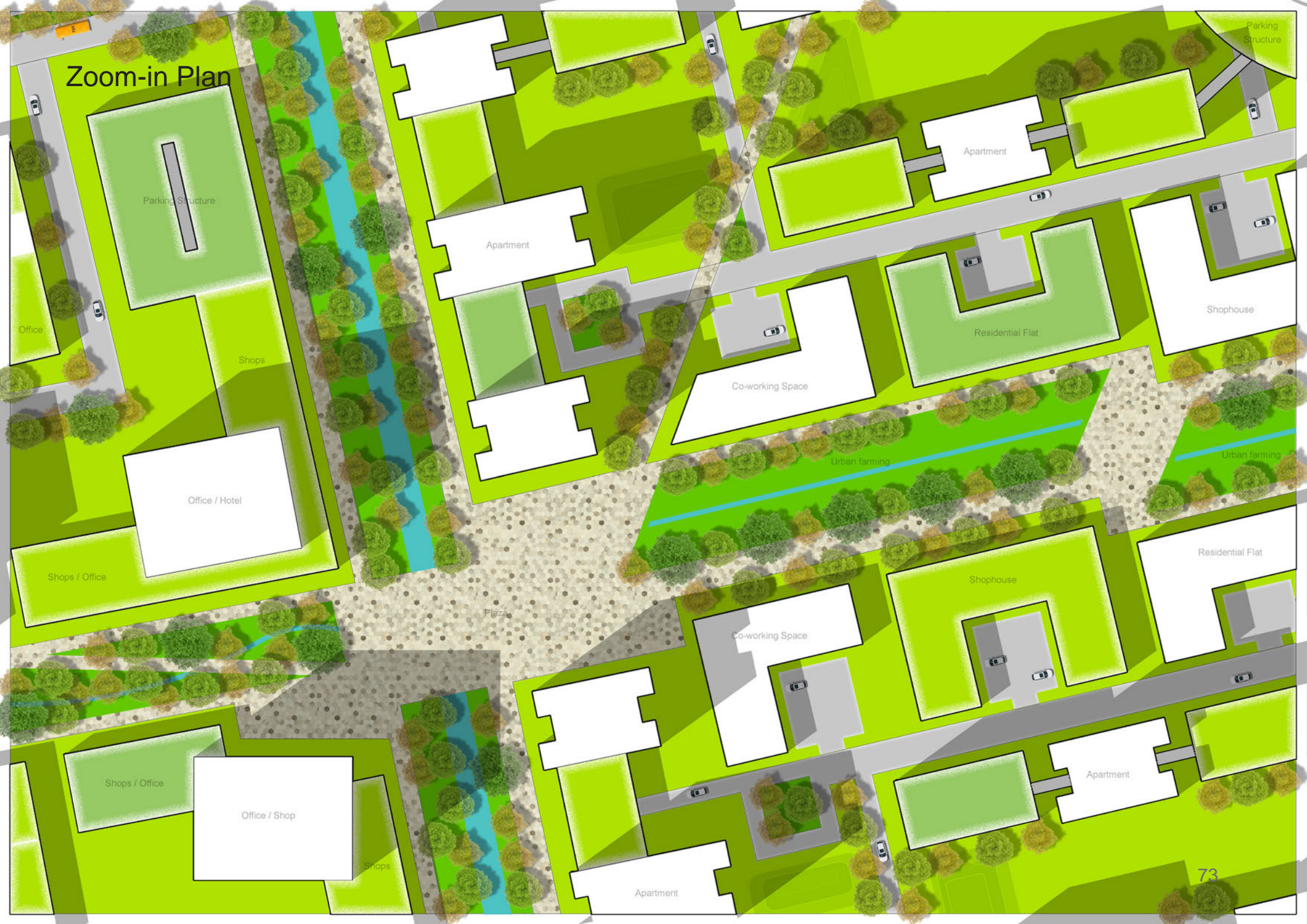


# Site Cross Section

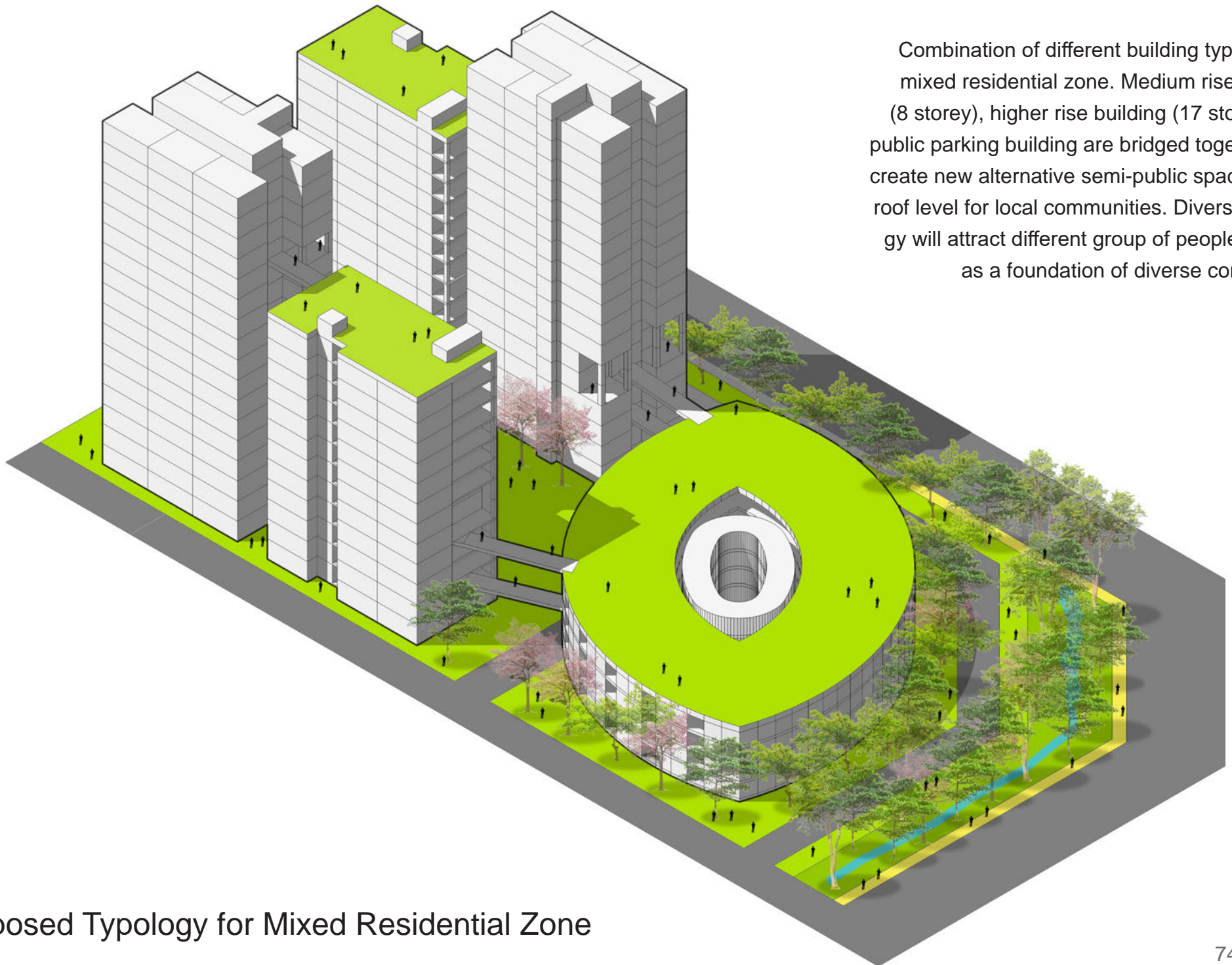




# Zoom-in Plan







Combination of different building typology for mixed residential zone. Medium rise building (8 storey), higher rise building (17 storey) and public parking building are bridged together and create new alternative semi-public space on the roof level for local communities. Diverse typology will attract different group of people and act as a foundation of diverse community.

Proposed Typology for Mixed Residential Zone



# Zoom-in Plan



Apartment

Walk up flat

Apartment

Walk up flat

Apartment

Community Plaza

Multifunction Hall

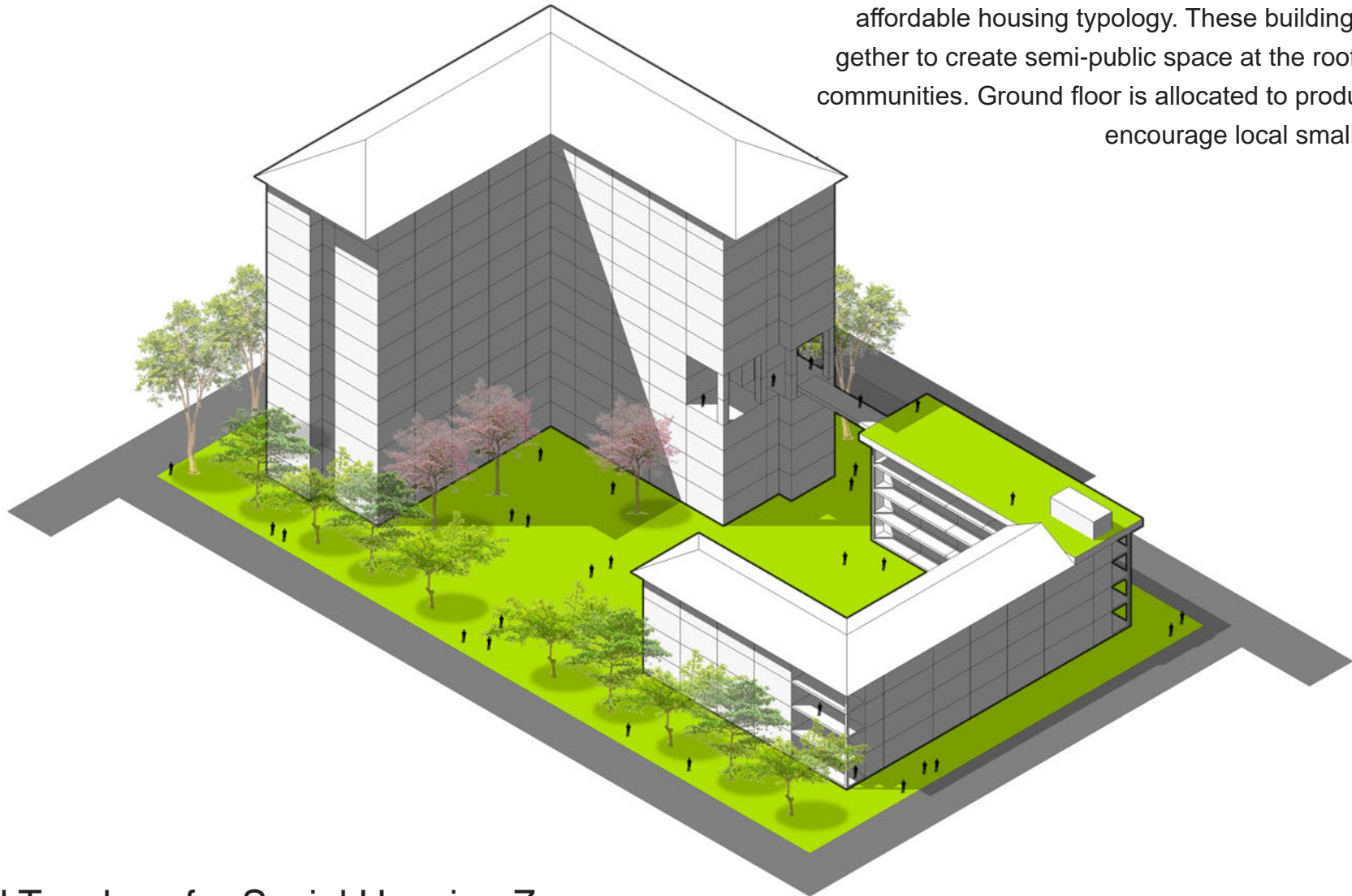
Apartment

Apartment

Walk up flat



In social housing zone, new typology is achieved by combining two different typology. Four storey walk-up apartment as the typical social housing project form from government is combined with ambitious medium rise building typology (8 storey) to increase the density and to provide different alternative of affordable housing typology. These buildings also linked together to create semi-public space at the roof top for the local communities. Ground floor is allocated to productive function to encourage local small scale economy.



Proposed Typology for Social Housing Zone



# Aerial Perspective - Social Housing Zone





# Street Section - CBD Zone





# Pedestrian Way and The Rain Forest - CBD Zone





# Street Section - Mixed Residential Zone





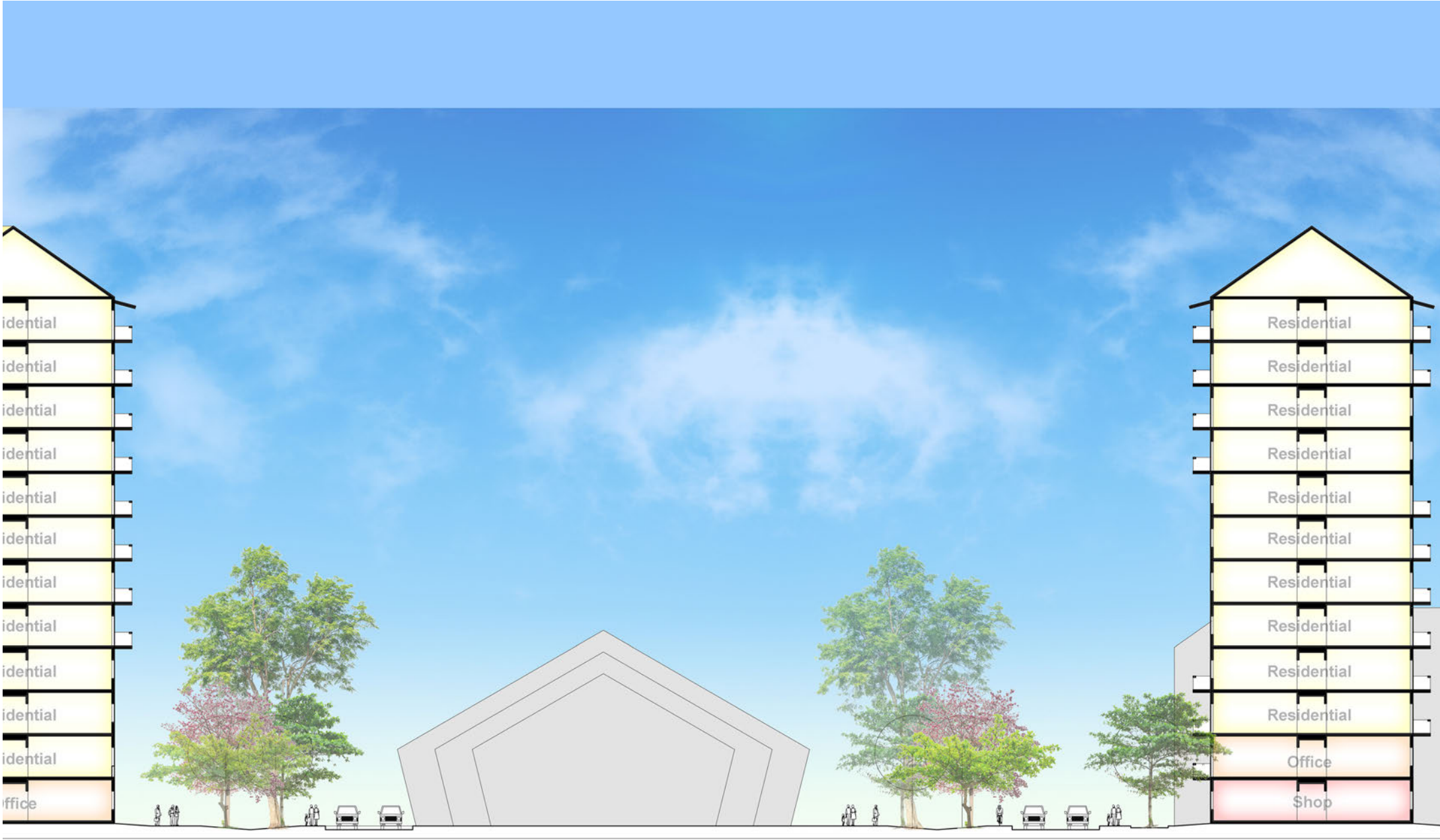
## Pedestrian Way and Urban Agriculture - Mixed Residential Zone













## Community Plaza - Social Housing Zone







## Conclusion

- Opening The City, Completing The Region:  
Transforming Urban Life in Trans-National Tropical City of Batam



## Opening The City, Completing The Region: Transforming Urban Life in Trans-National Tropical City of Batam

Batam City in Indonesia is a part of Southeast Asia's SIJORI Trans-National Region, which consists of three main territories: Singapore, Johor State (Malaysia) and Riau Island Province (Indonesia). This economic framework development has attracted many international investments and contributed to rapid urbanization in the region for the past five decades. Centered in Singapore as the global business and services hub, the counterparts are seeking opportunities to benefit from this cross-border cooperation mainly from industrial and tourism sector. Many differences exist, ranging from political system, socio-cultural context, economic structure, but they share similar geographical and climate context.

The future Batam needs to transform its urban development pattern in response to two different perspectives, to capture opportunities from the larger regional economic context, while also addressing local needs and challenges. Densification with careful attention to local cultural preferences is one of the drivers for the design, together with new typology as new identity. The design also aims to encourage walking and biking as a way to transform urban mobility, and to change the old mindset of dealing with urban green and blue elements by enhancing nature presence to establish a more sustainable city.





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Spring 2019