Sungai Buloh Wetland Reserve, Singapore

Mangrove wetlands with tide line, Riau Archipelago

The Singapore Straits from Tanjung Uma, Batam

Border between built and unbuilt areas, Lower Peirce Raser voir, Singapore

Architecture of Territory
ETH Zurich
FCL Future Cities Laboratory

Sea Region
Singapore, Indonesia, Malaysia
Project 2

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METROPOLITAN NATURE

The Role of Nature in the Trinational Metropolis

by
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Mangroves and swamps

Around one hundred and fifty years ago the region of Singapore, Johor and the Riau Archipelago was almost entirely covered by rain forest and mangrove wetlands. It was an environment of an enormous concentration and diversity for countless species of plants and animals. Throughout the XIX and the XX centuries until today, the urban growth put pressure on open space and on nature in all parts of the region: in the cities, along the coastline, and on the marine ecosystems. The coastal areas are environmentally most valuable in terms of biodiversity but at the same time, the pressure to build along the coastline is the highest.

The value of nature for society and the political practices related to nature transformation and nature protection in the region seem to be complex and unclear. Each of the countries uses its own logics and standards in the relationship to 'nature' and to 'green'; their value for the city and urban life seems to be still underestimated in comparison to European cities for example, where a more stable relationship to nature developed over time.

The purpose of the project Metropolitan Nature has been to understand and describe the processes of urbanization of nature in the region. After close examination, the project has identified and described four categories of 'nature' which have emerged in the region's development: Constructed Nature, Strategic Nature, Protected Nature and Land Banks. Each of the four categories carries a strategic role for urban development processes and practices in the region.

The project then proposes methods of working with existing nature areas that have the potential to lead to a common, transnational vision for nature areas. This vision is based on establishing new, cross-border ecologies, establishing public access to nature areas and ecologically continuous areas along the coastline.

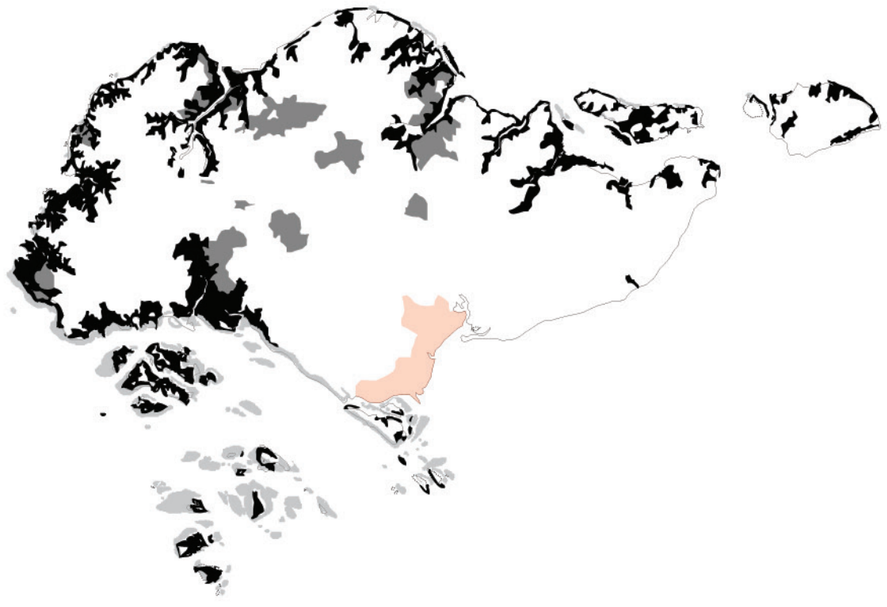
What Remains

After John Crawfurd travelled along the Johor Strait in 1825, he reported about the 'endless wood of the most magnificent timber'. The area of Singapore, Johor and Riau was covered with jungle. Today, the three countries of Singapore, Malaysia and Indonesia remain 'megadiverse' countries, which means that they belong to a group of countries that harbour the majority of the earth's species and are therefore considered extremely biodiverse.
With over twenty thousand species of flora and fauna, the trinational region is among the most biodiverse in the world. Yet, what remains today is only a fraction of what has previously existed. Altered landscapes, a sprawling built environment and an increasingly polluted sea have begun to replace the native biodiversity.

Map of megadiverse Countries, geography. about.com

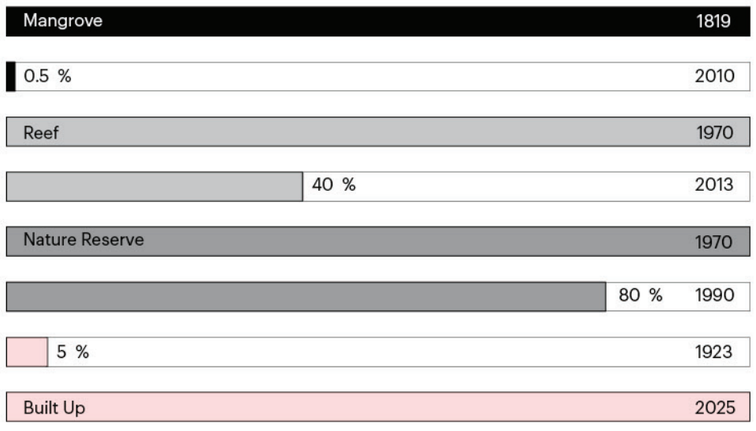
'Why bother about a few trees? It is true that a few trees, when cut down, have a comparatively small value; but it is not their individual value as dead timber with which we should be concerned'

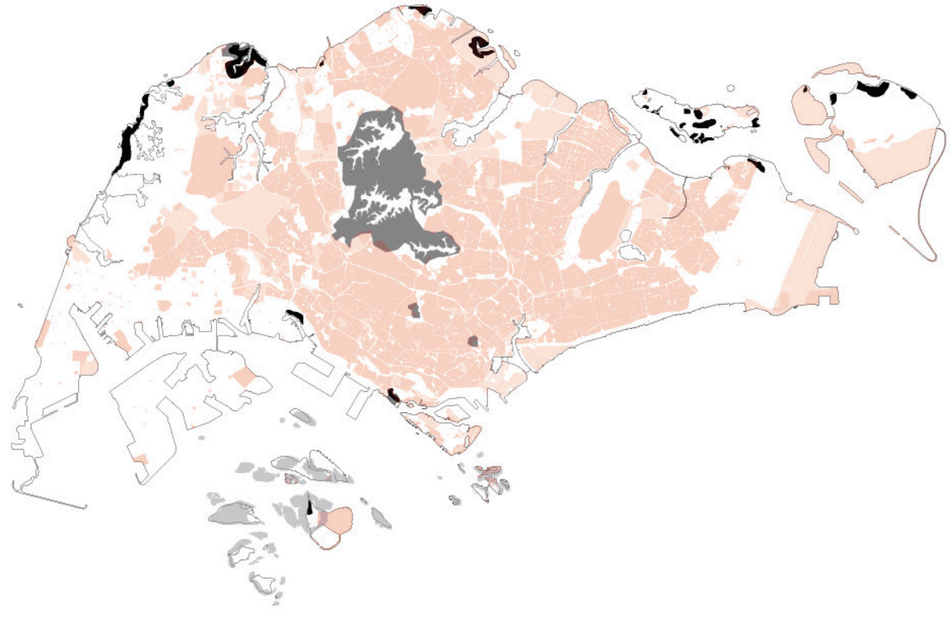
R.E. Holttum, Singapore Botanic Gardens director, 1926-1949 writing in the Straits Times (1950)



Legenda

- Mangrove by 1956
- Reefs by 1956
- Nature reserves by 1898
- Built-up by 1923





Legenda

- Mangrove by 2014
- Reefs by 2014
- Nature reserves by 2014
- Built-up by 2014

From City in the Jungle...

In 1820, when Singapore had a population of only 1000 people, the island and its surrounding land was covered with primary rainforest, freshwater swamp forest and mangrove. The clear water was full of sea grass beds and coral reefs, the habitat of a wide variety of maritime fauna.

To Jungle in the City

Thirty years later, only half of Singapore's native forest remained intact. Today, forests make up only 4.5% of the island's surface. Less than 2% of the original mangrove forests remain around the coastlines of the three cities of Singapore, Johor and Batam. Many of the species have been threatened by deforestation, new building construction and land reclamations such that only 40% of the region's potentially present species have been recorded. Only a few areas of original nature remain intact, appearing as little islands within the urbanized region.

Ideal of the Garden City

Managed green, frequent along the city's streets and medians, is what most city dwellers in Singapore see every day. This type of 'groomed nature' is for many the most common, if not the only, exposure to nature.
These kinds of greens are no longer self-generating ecosystems, they largely depend on human intervention for their maintenance and survival.

Gardeners at work,
Clementi Road

Constructed Nature

The spots shown on this map are areas of constructed nature. In these zones, green has been planned, designed and carefully maintained. City parks represent managed nature.

On the map, two types of constructed nature are shown. Dark pink represents the city parks, light pink represents the golf courses.

Mempat Tree

In 1963, former Prime Minister, Mr. Lee Kuan Yew, had a vision to make Singapore a garden city. That year, he planted a Mempat tree at Farrer Circus, implying the start of Singapore's greening campaign.

Name:
Chinese Garden

Type:
Water reservoir
Urban park

Size:
0.14 km²

Date of Production:
1975

Accessibility:
High

Garden as Urban Identity

The Chinese Garden was built in 1975 and spans 13.5 ha. The park was designed by Professor Yuen-Chen Yu, a well-known Taiwanese architect. The concept is based on classical Northern Chinese imperial architecture and landscaping.

The implementation of urban nature in form of a park is a common practice in Singapore. Today the Chinese Garden and a few other parks in Singapore have been declared nature reserves.

Production of Nature

Singapore's ideal of being a garden city evolved from a law introduced by the Housing Development Board, responsible for social housing projects. The law requires the implementation of parks after exceeding a certain amount of built dwellings. Today 287 parks exist in Singapore, most of which resulted from this legislation.

Urban Parks

The golf course is the typology of designed green which is closest to the urban park. The presence of golf courses around the trinational region is remarkable, whereas the urban park appears almost exclusively in Singapore.

Softening the Hart Edges

Singapore is reminiscent of a garden in the sense that most of the trees along the streets are regularly pruned and maintained. According to the tree planting campaign, between 1967 and 1990, 5 million trees were planted in Singapore.

Trees have many positive effects on the surrounding: they reduce noise pollution, provide shade and shelter, produce aesthetic benefits, create buffer zones around water catchment areas and improve street-level micro climates. The Singapore Green Plan, released by the Ministry of Environment in 1992, was one of the first formal plans to attempt to balance the country's economic and environmental needs.

Name:
Zaharan
Botanical Garden

Type:
Urban park

Size:
0.6 km²

Accessibility:
High

Johor's Garden

The Zaharan Botanical Garden is an addition to the Stultan Abu Bakar Royal Palace. It appears as the only major designed urban park in the region outside of Singapore.

Additional green spaces outside of Singapore are typically unplanned, residual green fields located between patches of urbanisation. Opportunities exist for the residual green to be designed and integrated into the existing urban context.

Enclosed Land

The water reservoir of Duriangkang is enclosed with a long fence and thus, withdrawn from the neighbourhood. Yet, a cutout opening in the fence leads to the lake, allowing children to informally use the reservoir as a fishing site.

Kids fishing at
Sungai Duriankang, Batam

Strategic Nature

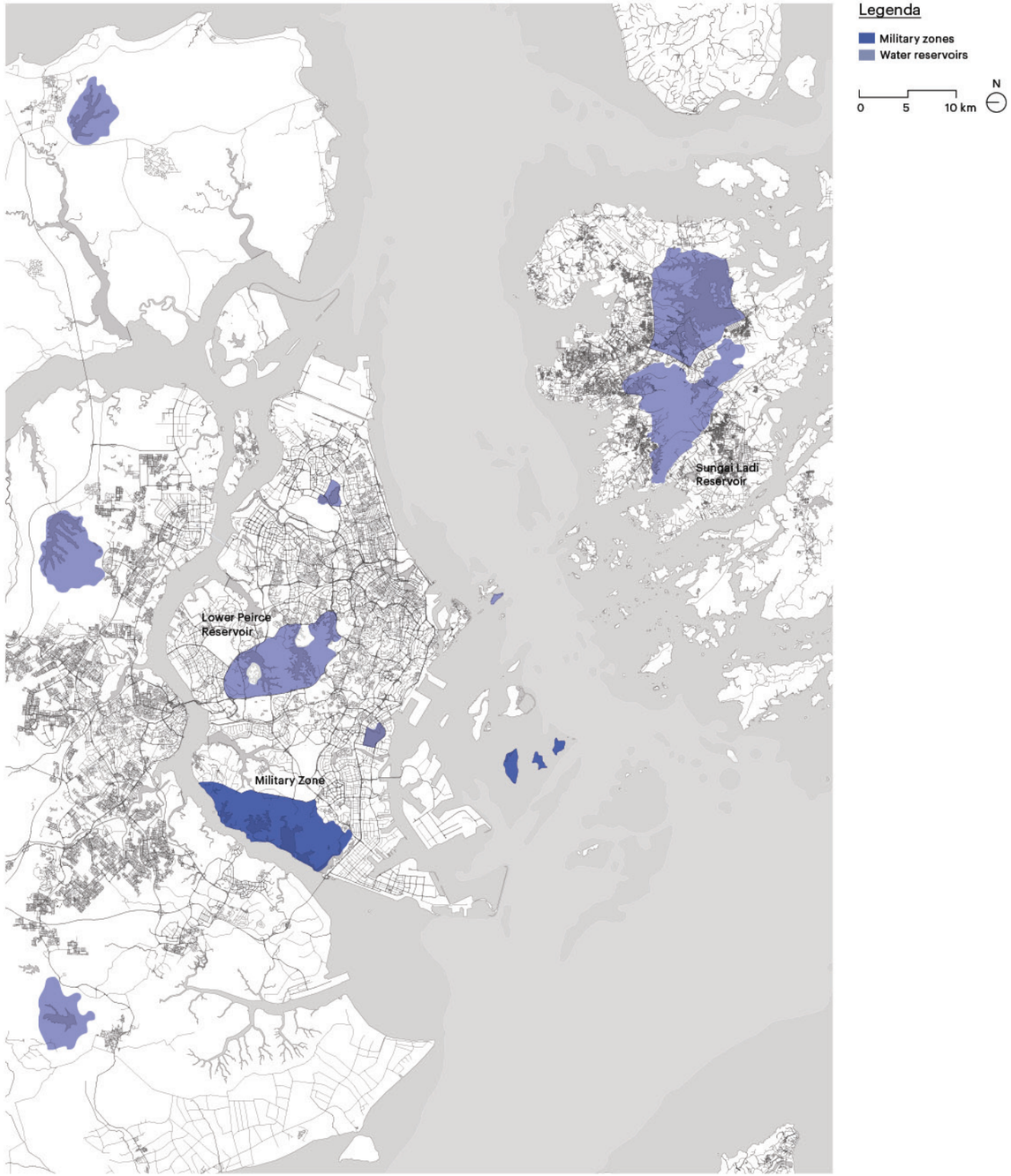
The blue patches cover all the natural areas that also serve a vital infrastructural function.

On the map two types of strategic nature are shown.

Dark blue emphasizes the military zones. Light blue indicates the water reservoirs.

Tembusu Tree

The Tembusu is a large evergreen tree in the family of Gentianaceae. It is native to Southeast Asia, and growing in open and swampy lowlands. The Tembusu is one of Singapore's most distinctive trees. The Tembusu is listed as a Singaporean heritage tree and appears in the back of its five dollar bill.



Name:
Sungai Ladi
Sungai Harapan
Muka Kuning

Type:
Water reservoir

Size:
52 km²

Accessibility:
Low

Storing Water

The Sungai Ladi water reservoir is one of 14 reservoirs of Batam and its surrounding islands. Batam's reservoirs provide enough water for its region. Since the population is growing rapidly, it strongly depends on its water resources. All of the reservoirs are under the protection of the government.

Coupled Functions

Water reservoirs in Batam are one of the few places where nature is protected.

Due to Indonesia's economic and political position, preservation of nature is more difficult than in developed countries. If a place like the Sungai Ladi Reservoir with its surrounding forests is under nature protection, it is likely due to circumstances that concern protection of the water reservoir from urban pollution.

Refused Access

Indonesian cities are often forced to construct a fence around their water reservoirs in order to protect them from illegal dumping of waste and water pollution. Another reason for putting a fence around the whole reservoir is to protect it from illegal construction. However, people living nearby find ways to use the reservoirs informally for fishing and swimming.

Name:
Upper Peirce Reservoir

Type:
Water reservoir

Size:
0.06 km²

Declaration Date:
1910

Accessibility:
Medium

Partial Public Use

The Lower Peirce Reservoir is one of the oldest reservoirs in Singapore. It contains many trees that are more than 100 years old. The Lower Peirce Trail is a small hiking track that takes visitors through the reservoir's mature secondary forest. The Lower Peirce Reservoir consists of different zones of public access. Next to a public road and the Lower Peirce Trail, the forest is inaccessible but not fenced in. Highly protected military zones and golf courses are part of the reservoir too. Fishing is allowed in certain locations, but swimming is forbidden. In comparison to the size of the whole reservoir, the accessible areas are rather small. Nevertheless the way Singapore uses the central water catchment as a partially accessible public place shows how various urban functions can be combined in such zones.

Protection as a Secondary Effect

The Singapore National Park board describes the Central Water Catchment of the Lower Peirce Reservoir as a nature reserve. Its valuable location within the city suggests that the effort to keep the reservoir protected is primarily out of necessity. Since 2005, the reservoir has been protected under the Parks & Trees Act, but prior to this it was only protected to guarantee secured water supply.

Lack of Service

Only a part of the waterfront is accessible. Based on the low number of visitors, the idyllic greenery seems to be underestimated by the residents. Beside a few fishermen, the Lower Peirce Reservoir is rarely visited. One issue concerns its lack of connection to the public transport system; it is only reachable by car. The lack of service facilities like toilets and cafes also poses a problem for the visitors.

Modified Nature

After walking through the forest paths, one has the impression that the Lower Peirce Reservoir is an unbuilt, natural leftover of Singapore's original landscape; however this is not the truth. The ground has been modified so that it can direct as much rainwater as possible into the lakes. Nevertheless, the nature reserve boasts a rich biodiversity with over 500 animal species.

Type:
Military zone

Size:
47 km²

Accessibility:
Low

Nature's Safest Border

Military terrains are used as training sites for the armed forces. These areas are characterized by lush vegetation surrounded by barbwire fences and warning signs. These sites are completely separated and do not have any exchange with the surrounding context. Even the coastline is negated by turning its estuaries into water reservoirs.

Rivers as Water Reserves

The original rivers within this site are turned into an interconnected water reservoir system.

Large dams harm biological diversity by flooding land, fragmenting habitat, isolating species, interrupting the exchange of nutrients between ecosystems, and cutting off migration routes. The Causeway, built as a dam, has had the same impact on the Johor Straits.

Border fence enclosing the Singaporean military zone, from the Johor Strait

Undefined Edge

The Johor River and its surrounding forests have been declared as forest reserves, protected areas for wildlife, flora and fauna. The Sungai Belunkor forest is one example of an area protected by the Ministry of Environment of Malaysia. Upon visiting the site, it appears that the edge of the protected area is not marked or maintained. This is potentially why one finds a stone quarry or a depot of metal waste in the heart of mangrove forest.

Stone quarry in between the mangrove forest, Sungai Belunkor, Johor

Unstable Protection

These areas represent the relatively intact natural areas. These areas still have a self-generating ecosystem and all of them are nominally protected. On the map two types of unstable protected nature are shown. Patches highlighted with a deep green are internationally protected. Light green patches are nationally protected.

Dipterocarp Tree

The Dipterocarpaceae are a family of 17 genera and approximately 500 species of mainly tropical lowland rainforest trees. Some species are now endangered as a result of overcutting, extensive illegal logging and habitat conversion. They provide valuable woods, aromatic essential oils, balsam, resins and are a source for plywood.

Name:
Sungai Buloh

Type:
Wetland reserve

Size:
0.9 km²

State of Protection
IUCN Category IV

Declaration Date:
2002

Accessibility:
High

From Shrimp Farming to Wildlife Park

Originally Sungai Buloh was used for shrimp and fish farms. In 1989 the site was declared as a nature park. Later the area was redeveloped into a park for wildlife.

The United Nations Environment Programme estimates that shrimp farming causes approximately a quarter of the destruction of mangrove forests in Asia (Hamilton, 2013). Thus, it is surprising that a big part of the park is a mangrove boardwalk.

New Master Plan

In 2001, Sungai Buloh was declared as a nature reserve. It was expanded from eighty seven to one hundred and thirty hectares. In the same year, the reserve was recognized as a site of international importance for migratory birds.

The production of a new master plan is in progress, which proposes to enlarge the reserve and to integrate it into the Kranji Countryside.

Singapore's Natural Heritage

Particularly significant is Sungai Buloh's unusually high variety of bird species, which includes migratory birds from as far as Siberia on their way to Australia. This is one of the reasons why Sungai Buloh is internationally protected. The World Wide Fund for Nature (WWF) has helped to manage the reserve ever since it was first protected. The strongest partner of all the heritage sites in Singapore is the International Union for Conservation of Nature (IUCN).

Consuming Wildlife

As a tourist attraction, Sungai Buloh has become popular and economically viable. Since Singapore has an extremely small amount of nature areas left, it is important for the country to protect it.

Cross-Border Relationship

Johor Bahru, on the opposite coastline, profits from Singapore's conservation sites; these provide a view into the green forests for the housing developments planned at the reclaimed Danga Bay area.

Name:
Sungai Pulai
Tanjung Piai
Pulau Kukup

Type:
Ramsar site

Size:
138,6 km²

State of Protection
Ramsar Convention
on Wetlands

Declaration Date:
2003

Accessibility:
Low

Biodiversity of the Rivers

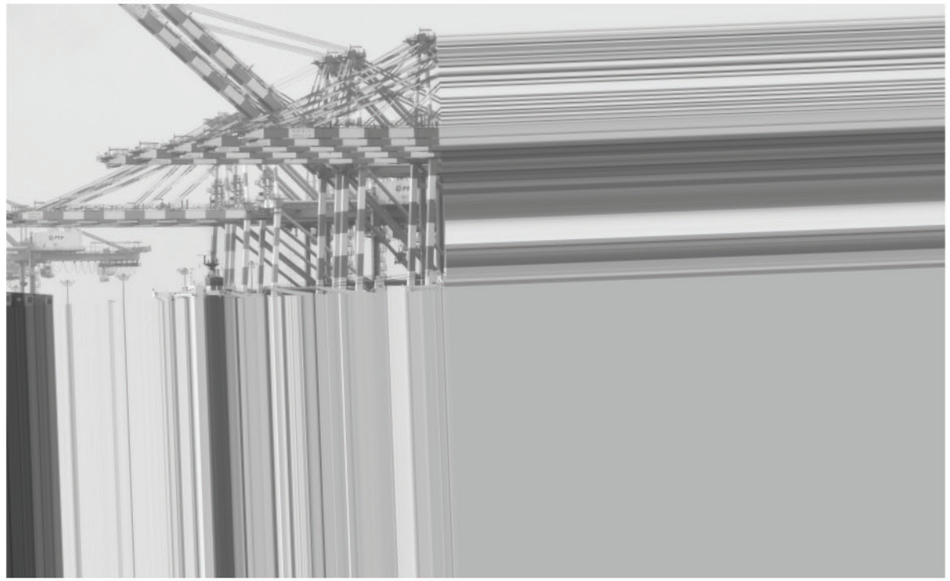
The Sungai Pulai carries the inflows of both seawater and fresh water, providing high levels of nutrients. River systems are the zone of the earth's highest biological diversity – but also of most intense human activity. An estuary is a semi-enclosed coastal body of water with one or more rivers or streams flowing into it, connected to the open sea.

Mangrove estuaries like the Sungai Pulai are among the most biodiverse and nutrient-rich natural habitats in the world. In 2003 the international Ramsar Convention on wetlands decided to put it under its protection status.

Ramsar Convention on Wetlands

The Ramsar Convention was formed to discuss the international impact of wetlands. The convention's mission is 'the conservation and wise use of all wetlands through local and national actions and international cooperation.' UNESCO for example cooperates with them and helps to secure a high level of protection for the site.

In 1999, four years before the site received protection, the Tanjung Pelepas container port was built at the river delta. The main consequence of this was the loss of sea grass beds, home to a large number of unique species in the region. The problem of the protection policy on marine habitats is, that there is no central agency responsible for the conservation of marine resources. This lack of central oversight exposes marine biodiversity to more risks than necessary.



Development Pressure

The Sungai Pulai River is under the jurisdiction of the planning authority of Iskandar, Malaysia. They are planning further developments like a new petrochemical and maritime industrial zone, which will soon cut its way into the site and the mangrove forest.

Local people, who are mainly fishermen, are being deprived their source of livelihood. They will also have to bear the health risks of living near a petrochemical plant.

Name:
Nongsa River

Type:
Forest reserve

Size:
2.2 km²

State of Protection
Under Bappeda

Accessibility:
Medium

Protection in Percent

Few of the protected sites in the region of Batam lie along the coastline, where biodiversity and the need for conservation are at their highest. Economically viable sites along the coast are less likely to receive protection.

The government's strategy for selecting protected sites is controversial and unclear.

Tourist Industry along the Coast

People in Batam know the Nongsa region because of its beautiful sandy coast, which had once been a local leisure and recreation space. Today the coast is being developed as a tourist attraction, simulating to Singapore's Sentosa Island. The property of the coastline is nearly fully sold to investors who are developing the land into resorts and golf courses.

Virgin Island

In the heart of Nongsa, where ferries shuttle tourists back-and-forth to resorts, an intact mangrove forest appears like an island in the midst of the surrounding development.

Supposed Mangrove Replantation

A new project is underway at the riverside. The construction workers in the picture are about to build a new bridge over the river. The clearing of the mangrove forest will be replaced through replanting efforts. The restoration and rehabilitation of existing or former mangrove forest areas is extremely important today. But actual planting of mangroves in such a place surrounded by forest is rarely needed as mangroves annually produce hundreds of seeds per tree, which under the proper water conditions can recolonize mangrove areas very quickly. So the primary issue is the polluted water and the lack of regulations concerning waste management along the river.

Ignored Value

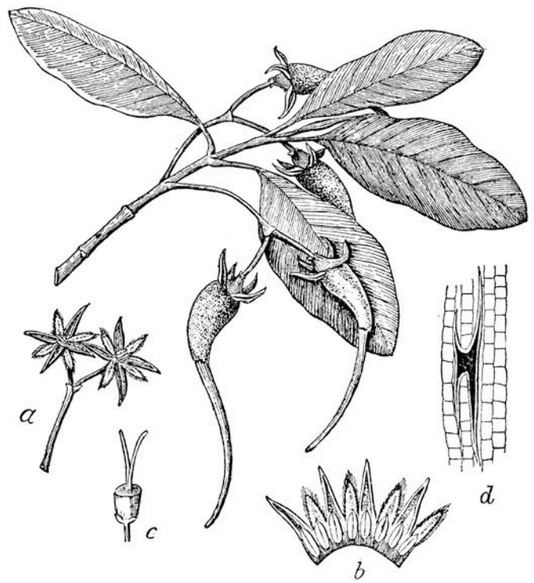
The Sungai Tebrau on the coast of Johor Bahru still maintains a few patches of its natural coastline.
The master plan of Johor Bahru's future development shows that the entire coastline will be reclaimed, developed or altered in the near future.

Kampung Senibong,
Johor Strait

Land Banks

The areas shaded in yellow are in danger of being developed or are already part of a development master plan.

These natural leftovers are located in unprotected areas facing rapid urbanisation.



Mangrove

Mangroves protect shorelines from damaging storm and hurricane winds, waves, and floods. Mangroves also help prevent erosion by stabilizing sediments with their tangled root systems. They maintain the water quality and clarity, filtering pollutants and trapping sediments originating from the land. Mangrove forests are home to a large variety of fish and help to regenerate the fish stock.

Name:
Sungai Melayu

Type:
Development zone

Size:
5.74 km²

Accessibility:
High

Natural and Cultural Heritage

The Kampung Melayu is one of the last kampungs in the city of Johor Bahru. Prior to 2012, it remained isolated from the surrounding urbanisation. In 2012, the Johor government positioned the Kampung Sungai Melayu as an agro-tourism destination to allow the kampung residents to profit from state's booming development. Yet, the master plan, updated in 2014, shows that the largest part of the Sungai Melayu river will be reclaimed and redeveloped with residential buildings and commercial properties.

Habitat in Spite of Development

Discussing biodiversity in a place surrounded by construction sites may seem surprising; yet, it seems that a majority of species have survived and remain in Sungai Melayu. Despite the extent of habitat destruction and modification, a diversity of marine and land life is still present.

The present approach, where development takes precedence over conservation, has not yet resulted in drastic reduction of marine biodiversity. Protecting the last patches of original green on the Johor Straits would be a positive step towards preserving the remaining biodiversity.

Name:
Sungai Tebrau

Type:
Development zone

Size:
14.7 km²

Accessibility:
High

Lack of Planning Capacity

The Iskandar Regional Planing Authority (IRDA) is responsible for the land use in the Johor Bahru region. One of the authority's five goals is the protection of the natural environment. Yet, the future plans and proposals of the IRDA do not seem to foreground the importance of environmental protection and management. The IRDA's explanation is that they cannot handle the speed of growth and development; thus, they are forced to make quick decisions that are sometimes unable to fully take environmental concerns into account.

Conquering the Coast

As Johor Bahru experiences economic growth similar to Singapore's own development in the past, the perceived gap between the two cities is not as large as it was only a few years ago. The most recent project, which helps to connect the cities, is a MRT route planned parallel to the Causeway. Singapore, in parallel, has as a consequence declared its northern shore as a future development zone.

Selling the Green View

Due to its location between the urban setting and the still intact nature, Sungai Tebrau is of great interest to developers and investors. Crescent Bay, a large housing project built over a forest along the river, promotes its apartments with the great view into nature across the river in Singapore. Yet, this natural view will not last long as there are already plans to develop these green areas.

Name:
Tanjung Uma

Type:
Heritage site

Size:
0.2 km²

Accessibility:
Medium

Batam's Oldest Village

Tanjung Uma is the largest and oldest fishermen village located in Batam City. Therefore, the local government assumed that Tanjung Uma has the largest indigenous communities and declared the villages a cultural heritage site. As a result, these villages will be saved from the plans of the Batam Industrial Development Authority, which proposed to use the site for housing estates.

Topography as Natural Border

The topography of Tanjung Uma is acting as a natural border and played a role in preserving the villages; a little hill surrounds the village and slope was too steep to accommodate development.

Resident's Resistance

Several riots and a number of protests have been taking place in Batam city. Tanjung Uma residents want to urge the development authority through a petition to recognize the village and 33 other villages as historically important.

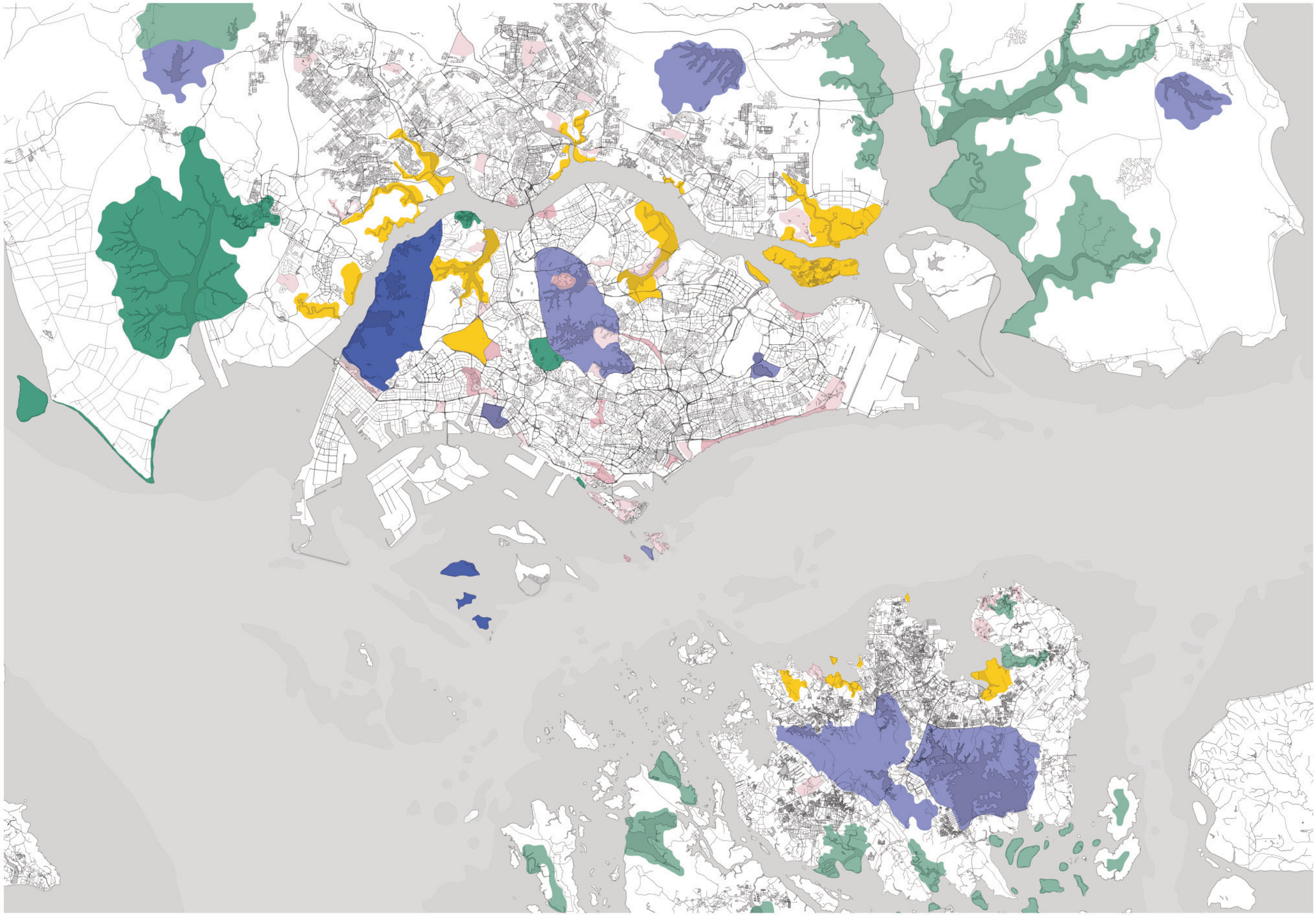
Changed Livelihood

The days when fishing was the village's only livelihood are over. Only a few residents still earn a living as fishermen. Most of the men are working in the city in the construction industry, textile industry, or on farms. Pollution of the mangroves and deterioration of the water quality has also made fishing a less viable occupation.

The Logic of the Green

After analysing the present condition, certain organizational logics of nature in the trinational city are identifiable.
Each country has its own logic for each of the presented typologies of nature and green. Factors that affect each country's management of these areas include: wealth, the amount of land available, population, and its relationship to neighbouring countries. Time is also an important factor. Part of the areas of our category 'Land Banks' used to be protected forty years ago; some of the areas of 'Constructed Nature' used to be primary forests.

Integral Greenery and landscaping of Singapore's public Housing Board Developments (HDB), Bukit Batok, Singapore


Legenda
Constructed nature
Strategic nature
Protected nature
Land banks
0
2.5
5 km
N

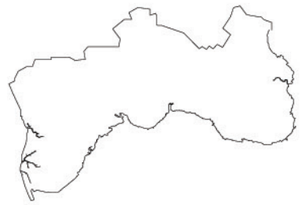
Batam Island

Effective Nature Area in the Region

Amount of 'Nature and Green' in Square Metres per Capita

	Effective Nature Area in the Region	Amount of 'Nature and Green' in Square Metres per Capita
Constructed Nature	0 %	0 m²
Strategic Nature	27 %	121.5 m²
Protected Nature	5.4 %	24.3 m²
Land Banks	2.7 %	12.2 m²

Johor Bahru District

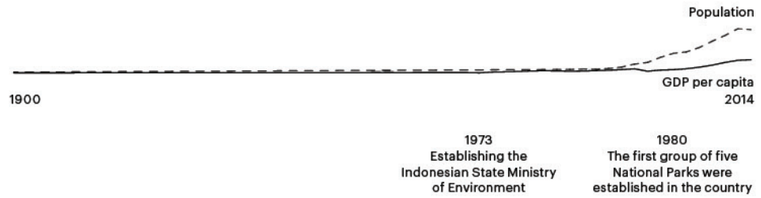


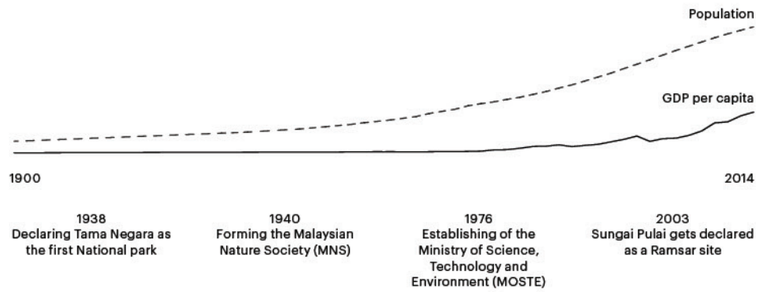
	Effective Nature Area in the Region	Amount of 'Nature and Green' in Square Metres per Capita
Constructed Nature	0.1 %	0.8 m²
Strategic Nature	2.5 %	21.2 m²
Protected Nature	5.5 %	46.5 m²
Land Banks	4 %	33.85 m²

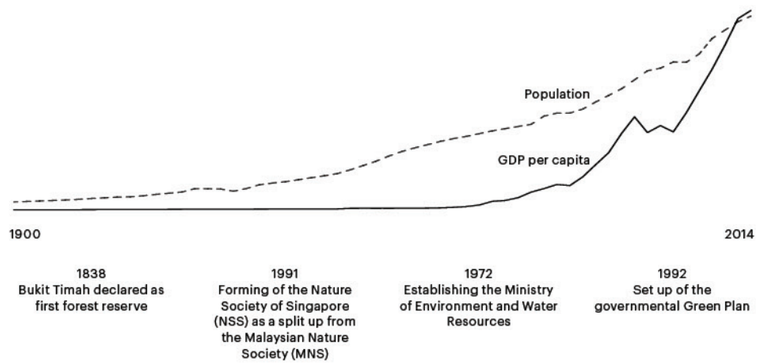
Singapore

	Effective Nature Area in the Region	Amount of 'Nature and Green' in Square Metres per Capita
Constructed Nature	2 %	2.6 m²
Strategic Nature	13.5 %	17.9 m²
Protected Nature	1 %	1.3 m²
Land Banks	5.5 %	7.3 m²

Development of Nature Protection through Time







Batam

There are only golf courses and no public parks in Batam. Water reservoirs are of high importance to the island due to its geographical isolation, and cover big parts of the island. Protected nature areas are distributed onto uninhabited islands and unaccessible areas, rather than to environmentally significant locations for the city.

Close to the city centre there are only few natural coastal areas remaining, that would have a potential to be protected.

Johor

As planned nature and green areas in Johor Bahru are only the Botanic Garden and numerous golf courses. Since the city is located on the mainland water supply from water reservoirs is not necessary.

Further outside of the city, large areas of protected nature can be found, since land shortage is not a problem for Johor.

There are many natural patches remaining around the city centre, which are facing the pressure of future developments.

Singapore

There are many public parks in Singapore and the number of golf courses in comparison to the rest of the region is comparatively low.

Water reservoirs are also of very high strategic importance for the island, to secure its independence. The reservoirs are strictly protected and no urban development is allowed in their proximity.

There are hardly any protected areas in Singapore, due to limited land reserves. The natural left over sites can be found in thin stretches along the coast.

Metropolitan Parks

Our proposal aims to rethink the value of existing green and open for the general public and their possible modifications, conservation and protection. All propositions aim to improve living quality and environmental well-being in the region. Parks need to be well distributed throughout the region. Nature with strategic or infrastructural uses should also be opened to the public. Natural areas outside the metropolitan core should be accessible. The remaining natural coastline should be preserved and reinterpreted, not only as border between water and land, but also as contact between nature and city.

Rethinking of metropolitan green; The second coastline

Sultan Iskandar
Lake Park

Johor Strait
Coastline Park

Pulau Ubin
Nature Park

Johor River
National Park

Central Catchment
Lake Park

West Johor National Park
Ramsar Conservation Park

West Coast
Lake Park

Southern Islands
Maritime Park

Maritime Biodiversity
Park

Sekupang
Coastline Park

Batam Central
Coastline Park

Batam Island
Lake Park

Riau Archipelago
National Park

Metropolitan Parks

- Urban parks
- Lake parks
- Great outdoors
- Second coastline

0 2.5 5 km

N

Urban Parks

The Urban Parks are located in the metropolitan core and appear as public green and open spaces integrated in the urban setting. Being of variable sizes, the urban parks take advantage of unique or unused spots throughout the city.

For the residents, it is important to have a park within walking distance or easily accessible by public transport. Main uses are active or passive recreation in the daily city life, which means that open fields, playgrounds, sport facilities and cafes are part of the park's program.

Amount of Constructed Nature

Current	16 km²
Proposal	38 km²

Lake Parks

The lakesides are part of the water reservoirs throughout the metropolitan region and appear as large patches of strategically protected nature mostly surrounded by residential areas. Since the ground in the forest is modified for filtration of water, an intensive alternative use is not conceivable.

Instead, the proposal introduces urban parks along the shore of the lakes and connects paths through the forest to the city. Thus, the lakesides serve as local recreation areas in the metropolitan region. Basic services and advanced public transportation are provided. Sports like hiking or fishing as well as public events and educational projects are part of the program.

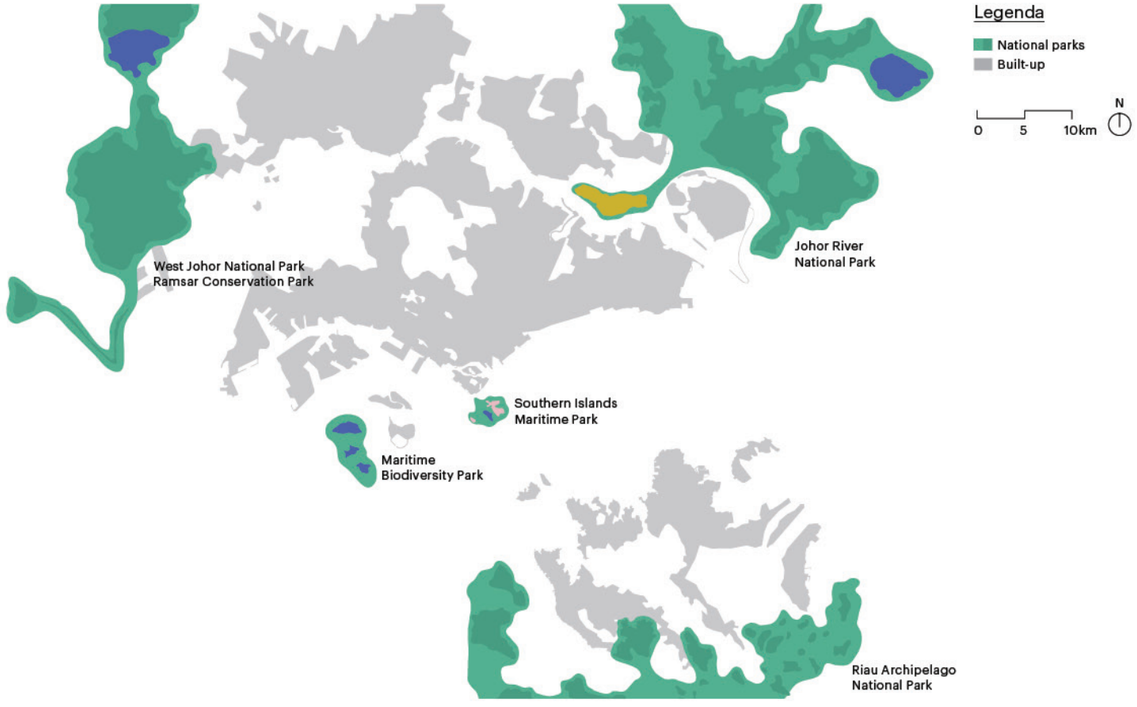
Amount of Accessible Space in the Strategic Nature Areas

Current	5 km²
Proposal	45 km²

Great Outdoors

The Great Outdoors refers to three huge patches in the proposed plan, that unite several areas of protected nature mainly consisting forest and rivers. These patches appear at the edge of the metropolitan core and do justice to the picture of wild, intact nature. The great outdoors are accessible as a weekend destination and thus require minimal infrastructure.

Whether over land or water, guided or unguided, a trip to the Great Outdoors is an adventure. Bird watching, night fishing and other activities are offered and connected to a possible overnight stay in a kampung. Educational and environmental projects also help to conserve the natural and cultural heritage of the region.

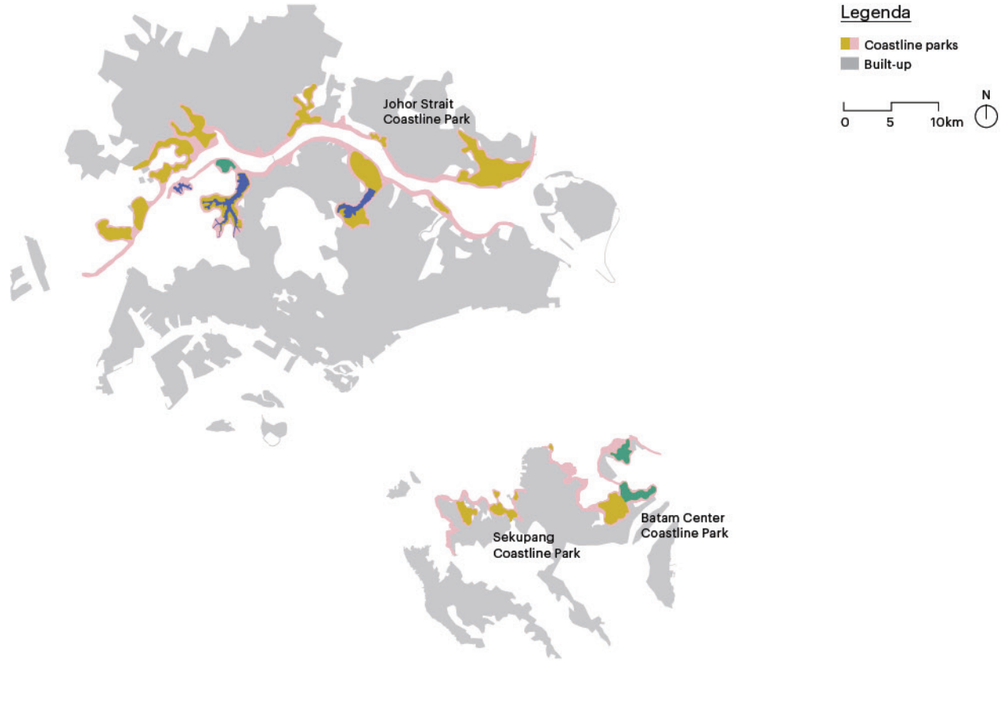


Amount of National Parks and Conservation Areas

Current	158 km²
Proposal	383 km²

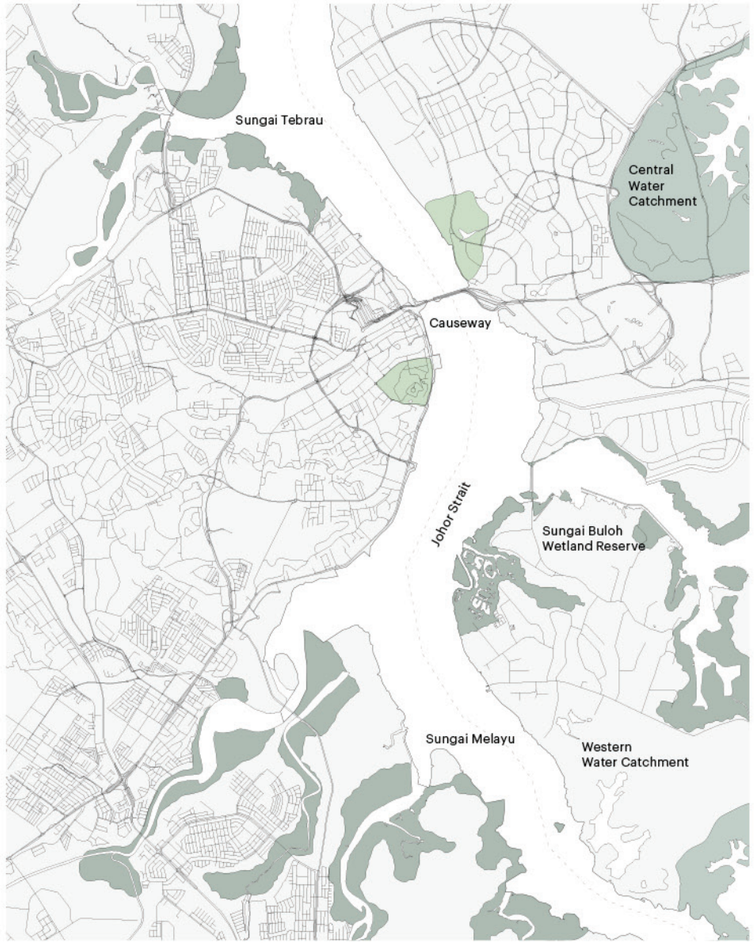
Second Coastline

The Second Coastline consists of diverse natural leftover areas along the coasts of the metropolitan region. They appear at the edge of each city, often facing the neighbouring city. Lacking protection, these areas face significant development pressure. The proposal aims to rethink these river mouths as an extension of the actual coastline. Natural bays reach inland, enlarging the highly valued coastline of the metropolitan core. The new coastline is no longer the line where the land meets the sea, but where the built fabric meets coastal nature. Urban parks, with paths and open spaces are part of the second coastline. The residents around the second coastline benefit from the proximity to the green. The Second Coastline increases living qualities in the cities, but also changes the character of the existing border zones, making the three cities more open to each other and to the sea.



Length of the Green and Public Coastline

Current	183 km
Proposal	285 km



Legenda

- Remaining woods
- Parks and paths
- Waterbodies

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Left:
Existing green areas

Right:
The second coastline;
Future scenario of the metropolitan green areas along the Johor Strait

Second Coastline Project

The remaining forests along the rivers are preserved in their present state. Urban parks are introduced along the shore of the Johor Straits and the rivers leading towards it. A second layer of green is added, which creates a connecting line between sections of the coastline and frames the remaining green areas. It mediates between the urban fabric, the remaining forests and coastline and increases their accessibility for the public. A connected 'green coastline' is created, from which other urban parks, which would lie further inland are also accessed.

Through these interventions, the area which was previously available for development shrinks, but its value in terms of quality-of-life and location increases. The construction of the Causeway as a bridge instead of a dam is proposed to make the Johor Straits flow again; more bridges will follow and borders will fade.

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