National University of Singapore
Department of Architecture
M.Arch 1 Options Design Research Studio
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ArcDR3 Studio

SINGAPORE UNDER SEA-LEVEL RISING

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Singapore: East Coast Park, Wikipedia: https://en.wikipedia.org/wiki/East_Coast_Park#/media/File:1_east_coast_park_panorama_2016.jpg

1. INTRODUCTION OF STUDIO

The studio is conducted as a part of Arc DR3 Initiative (The Architectural and Urban Design for Disaster Risk, Reduction and Resilience Initiative) This International Initiative is coordinated by the International Research Institute of Disaster Science (IRIDeS) at Tohoku University (Japan), xLAB, at University of California Los Angeles (UCLA) and Miraikan at the National Museum of Emerging Science and Technology of Japan. Other participants from the Association of Pacific Rim Universities include UCLA, UC Berkley, Tsinghua University, the University of Malborne, the Pontifical Catholic University of Chile.

2. INTRODUCTION: SEA-LEVEL RISING – PERPETUATING A SENSE OF CRISIS

We should treat climate change defences like we treat the SAF [Singapore Armed Forces] - *with utmost seriousness. Work steadily at it, maintain a stable budget year after year, keep your eye on the target, and do it over many years and several generations. That way, we can afford it, and when we need it, we will be ready. Both the SAF and climate change defences are existential for Singapore. These are life and death matters.*
Singapore Prime Minister, Lee Hsien Loong, National Day Rally on 18/08/19

Singapore, an island state located near the equator, is more vulnerable to climate change than the global model suggested. In recent years, Singapore has seen effects of the change, including more intense rain fall and prolonged dry spells. Sea-level rising, possibly the most impactful on the lives of Singaporeans, is happening day by day despite no current visible physical effect.

Sea-level rising, according to the National Climate Change Secretariat (NCCS), will be about 1 meter in 2100, although similar projections by different authorities inform that it could be maximum 4 meters depending on the rate of temperature rise. The sea-level rising seems extremely gradual and it would not create a dramatic sea water inundation immediately. However, for a low-lying state such as Singapore, it would be a great concern as its assets – buildings and urban infrastructures are

threatened. Furthermore, as one-third of the land including the Central Business District is less than 5 meters above current sea level, there is a risk of losing significant area of land and economic function of the city state.

The temporal and physiographical nature of this climate change in Singapore: the graduality that gives an impression an immediate response is not required and the low-lying landscape that develops a fear of the life-threatening impact, create a unique situation for its climate change defences. As Prime Minister, Lee Hsien Loong, mentioned in his speech, the state should take the sea-level rising "with utmost seriousness" for "over many years and several generations", and it will cost an estimate of $100 billion or more over 100 years to protect the country against rising sea levels. It suggests a perpetuation of a sense of crisis so that the people will be constantly alerted, developing knowledge, implementing such knowledge to various practices.

The perpetuation of this sense of crisis is vital for the climate change defences and urban resilience. Rather than dealing with the issue in a technocratic manner and assuming a solution in place, it constantly reminds people the danger and threat, and encourages them to be prepared. Such a sense of preparation is necessary to survive disasters caused by the change that often take place in an unpredictable and unprecedented manner. Furthermore, it provides opportunities for people to constantly invent alternative design and life style that accompanies the progress of technology, socio-economic transformation and political situations.

3. STUDIO EXPLORATION: SYSTEMATIC AND PROTOTYPICAL

Based on the idea above, our design studio, consisted of approximately 10 M. Arch 1 students, will explore systematic and prototypical urban and architectural designs. Engaging with a particular urban site in Singapore, the former deals with an urban-scale network and infrastructure that responds to the sea-level rising in progress, while the latter deals with the design of architectural-scale nodes within the network.

The studio will take an accommodative approach. Assuming that a part or whole of the site will be gradually encroached by the sea-water and sunken under the sea, the studio will generate systemic and prototypical ideas that respond to these different situations.

In the initial stage, the studio will conduct a close investigation of environmental transformations, current implemented infrastructural ideas and their future potentials. The focus of this stage is to speculate as realistic as possible a future urban condition under sea-level rising while staging these conditions with a convincing narrative.

In the subsequent stage, the studio will develop systematic and prototypical ideas and produce actual designs that accommodate the sea-level rising yet avoid disastrous and destructive impacts caused by it. The goal of this stage is to produce a cutting-edge design and critical thinking by responding to the environmental situation created by the sea-level rising.

4. PEOPLE, LIFE AND ARCHITECTURE: SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION

One of the focuses of the studio is to explore a transformation of life and activity pattern of the people under the sea-level rising in progress. To survive this uncontrollable natural force and to establish a resilient system for a sustainable urban settlement, people would commit to a variety of activities, while changing their life styles. Such life styles could be more primitive than our consumer-oriented society today, or more advanced due to a development of information technology. But one thing for sure is that they will invest in disaster-risk reduction and commit to constant recovery and reconstruction. Such an exploration will conform the Priority 3 and 4 in Sendai Framework for Disaster Reduction issued by United Nation Office for Disaster Risk Reduction (UNDRR).

Life and activity patterns in the future will be also affected by other factors as well: a transformation of global economy, development of information technology and so forth. Based on this, the studio's interest is also in how such patterns emerge and evolve in relation to existing built environment. By working with existing buildings and places, transforming them for alternative uses, and most importantly, by providing opportunities for people to commit to the disaster-risk reduction, the studio will explore a historical continuity in the future.

5. SITES

Four potential sites for the project is shown below. All the sites have different characteristics and response to the sea-level rising will vary. If we choose to emphasize the pursuit of systematic and prototypical aspects of the project, the studio should take all the four sites, and produce different types of schemes but a depth of the research, a response to the particularity are compromised. If we focus on one of the sites, the research will be more thorough and the project will benefit from the depth of thought. To decide the site, we need more time for the collation of more opinions from ArcDR3 Organizers and colleagues.

A. Brani Island

Brani Island, opposite of Keppel Harbour, a part of the past container port in Singapore is currently planned to be developed as a resort island. Urban Redevelopment Authority (URA) designate the site as a part of Greater Southern Waterfront (GSW), the continuous waterfront promenade. The URA is also considering to turn a water way between the Harbour and the Island to Southern Reservoir. A part of the site is threatened to be under water in 2100.

B. Central Business District

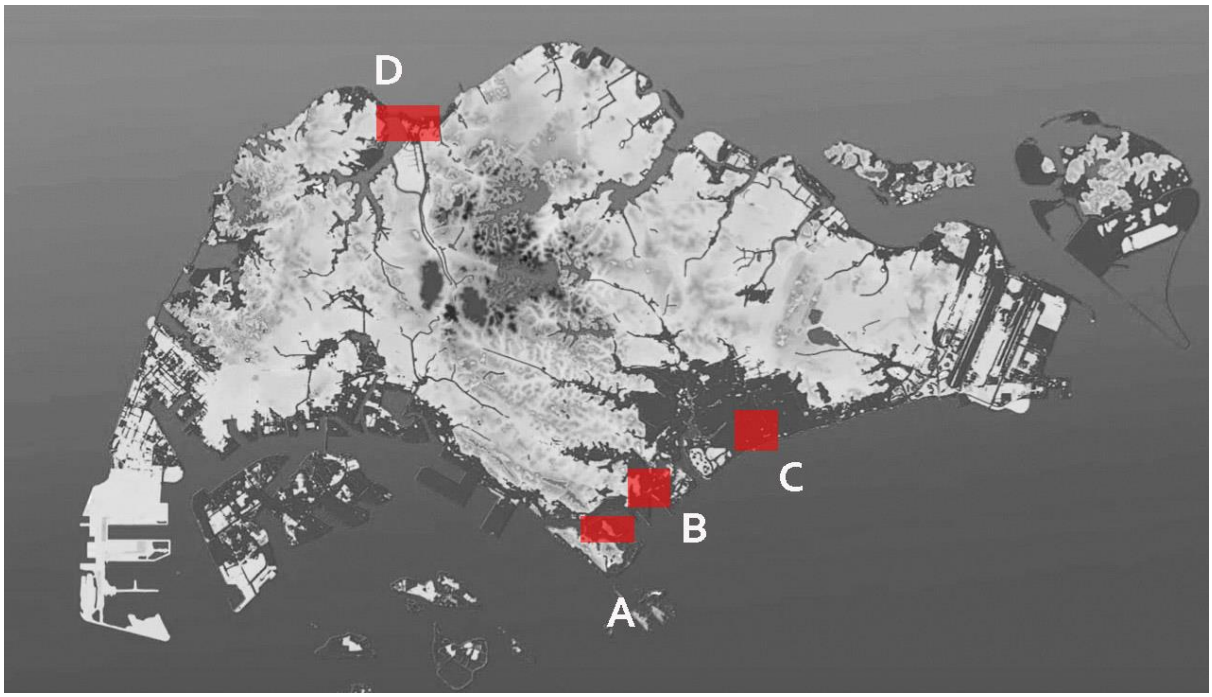
North of Keppel Harbour, along with Robinson Road and Shenton Way, the oldest business district is the Singapore's most densely built up area. Current programs are mainly office, commercial and residentials. The most of the area is threatened to be under water in 2100. The economic impact will be significant if the district still works as a centre for business in the future.

C. East Coast Park and Katong

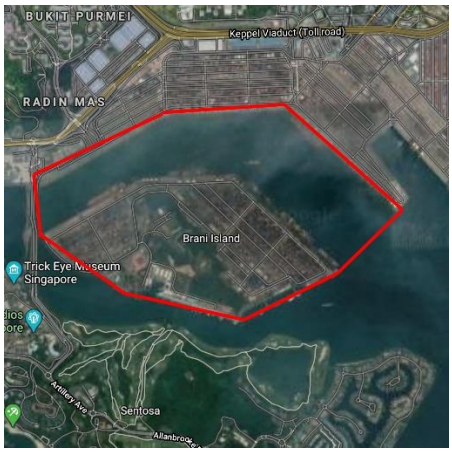
East of Singapore River, the area consisted of a south shore reclaimed land, East Coast Park, and a high-rise condominium area at the north of the park, and a low rise residential and commercial area on further north. It has numbers of heritage buildings including colonial bungalows and shophouses. The area will be also affected by the sea-level rising. Currently, there is an on-going plan: a part of Greater Southeast Waterfront (GSW) will be modified to make a defence island to protect the entire East Coast Area.

D. Woodlands

Close to Lim Chu Kang, Sungei Wetland Reserve, the Woodlands is a high-rise public housing area. Facing the north shore of Singapore, an original biodiversity is maintained. Under the sea-level rising, both the wetland and housing area will be affected.



Singapore: area under water in 2100 (in dark gray), and designated sites (in red). Image based on C&W – Remaking of Greater Southern Waterfront and climate change activities could set stage for "Great Eastern Waterfront" says Cushman & Wakefield (C&W) Research.



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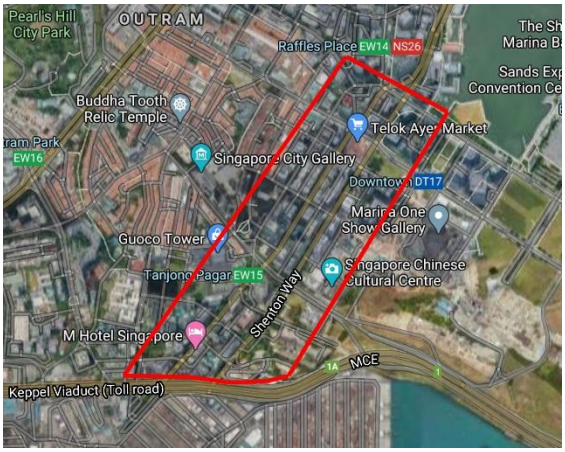

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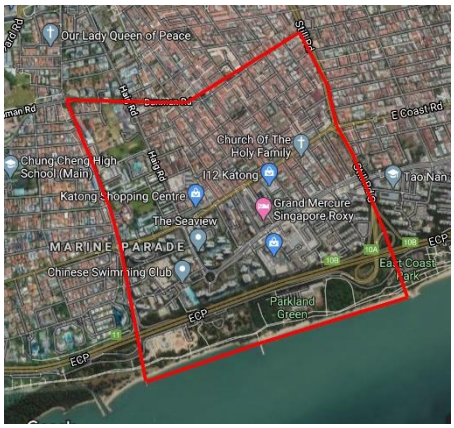
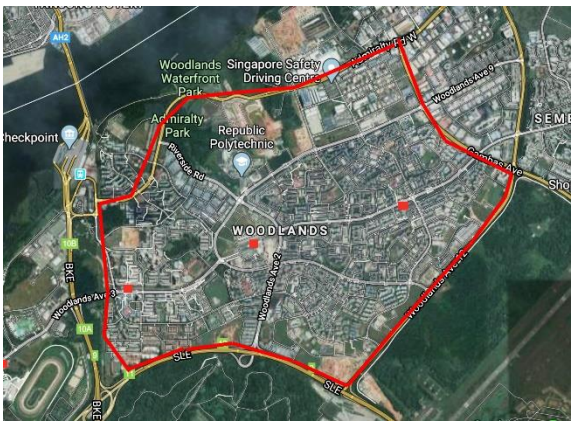


D. East Coast Park and Katong



C. Woodlands

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