

# Climate Change – An Immense Planning Challenge for Singapore

Singapore is acutely vulnerable to climate change. Between 1984 and 2022, mean annual temperatures rose by 0.24 °C per decade, and sea levels around the island have been rising about 3.5 mm/year since 1993. Rainfall has also intensified—up by ~83 mm per decade since 1980—signifying harsher storms and riskier floods. Projections from the 3rd National Climate Change Study warn of up to 1.15 m sea-level rise by 2100—and even spikes of 4–5 m during extreme tides or storm surges. With ~30 % of Singapore < 5 m above sea level, low-lying areas like the East Coast are particularly exposed. Meanwhile, urban heat islands amplify local temperatures by up to 7 °C compared to greener zones, while climate models project between 41 and 351 days/year above 35 °C by century's end.

All these indicators bring about challenges in ensuring that the right policies and strategies are in place to plan Singapore as well as having the right tools to identify issues as well as to track and measure progress.

## Current Policies & Planning Measures

### Water & Flood Management

Singapore's Public Utilities Board (PUB)—via the Marina Barrage (Singapore's inaugural cross-drainage regulator opened in 2008)—has provided coastal flood protection and dual use water supply through reservoirs and pump systems. In Sept 2023, a S\$125 million research fund and a centennial S\$100 billion Coastal Protection & Flood Management strategy were announced to develop long-term resilience.

Ms Hazel Khoo, Director of PUB's Coastal Protection Department, noted: "As a small coastal city with many low-lying areas, Singapore is particularly susceptible to rising sea levels... Through this [Coastal-Inland Flood Model], we aim to enhance capabilities and deepen our expertise in modelling to support coastal protection efforts."

### Land Use & Coastal Adaptation

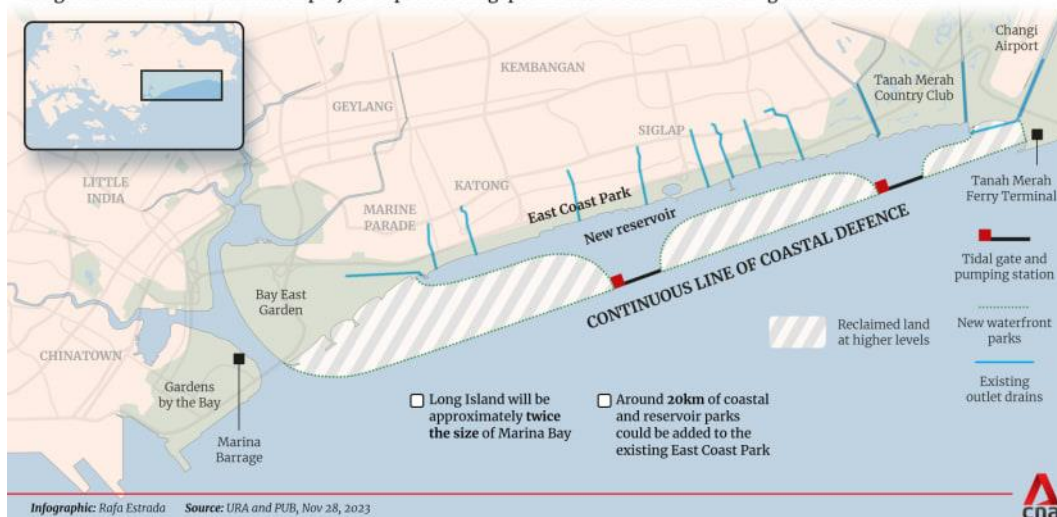
The Urban Redevelopment Authority's Draft Master Plan 2025 (DMP2025) embeds "Strengthening Urban Resilience" as a core theme, alongside sustainable growth and heritage stewardship. It echoes the National Climate Study in projecting sea-level rise over 1 m by 2100, and integrates large-scale engineering and nature-based defences—like new flood barriers, green buffers, and coastal setbacks.

Mr Lim Eng Hwee, CEO of the Urban Redevelopment Authority (URA) and during URA's "Shaping a Heat-Resilient City" exhibition, reinforced the importance of adaptable urban planning in response to climate uncertainties: "As a highly urbanised city-state, we need to keep abreast of global trends and work together to ensure that our plans remain adaptable for different scenarios, such as the challenges from climate change."

A flagship initiative is the proposed "Long Island"—a 1,000-football-field landform off the southeastern coast—designed to protect against worst-case 5 m sea-level scenarios and offer new waterfront living.

### What Long Island at East Coast Park could look like

Long Island is a land reclamation project to protect Singapore's East Coast from flooding and sea level rise



### Cooling & Heat Mitigation

Arup's Urban Heat Snapshot has identified a large cluster within the Singapore Central Business District (CBD) – including not only high-rise areas but also historical low-rise streets – as the most extreme “hot spots” in Singapore, experiencing temperatures 6.5°C higher than their more ‘rural’ surroundings. <https://www.straitstimes.com/singapore/environment/telok-ayer-among-hottest-spots-in-s-pore-urban-heat-study>

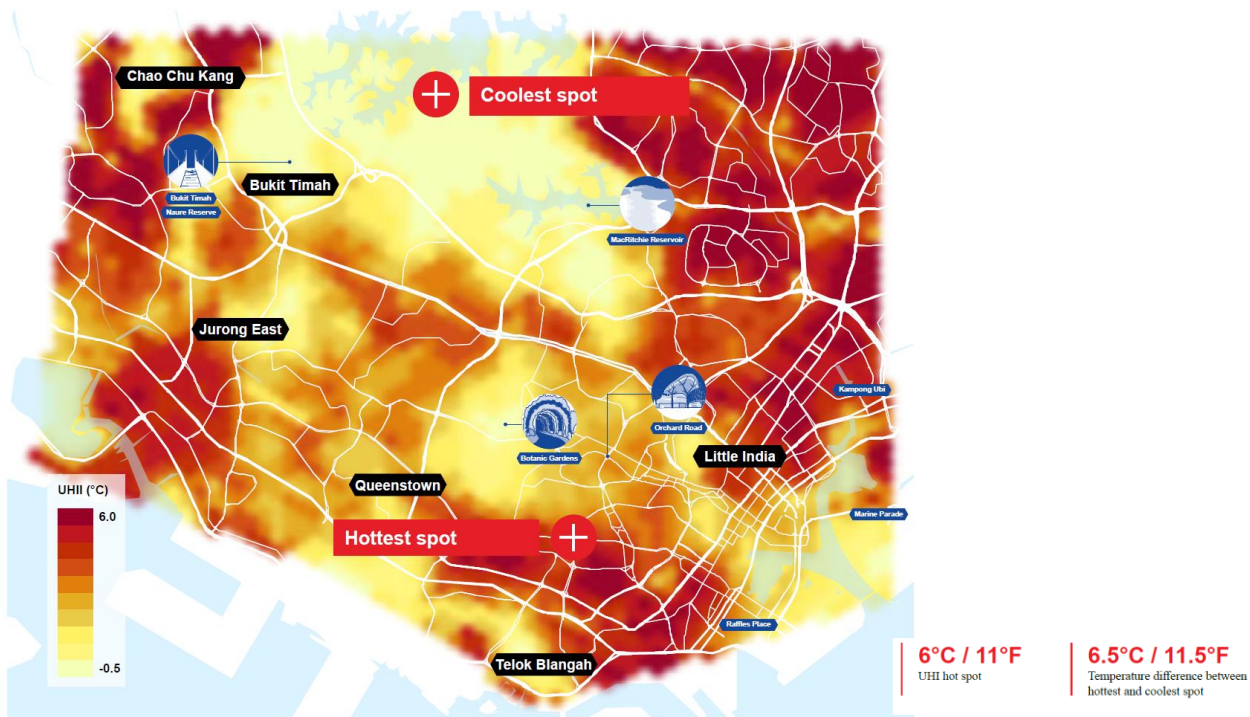


PHOTO: ARUP

To combat urban heat, Singapore's Green Plan 2030 aims to double annual tree plantings and ensure every household is within a 10-minute walk from a park. URA supports rooftop greening through its Skyrise Greenery initiative. PUB runs district cooling, particularly in Marina Bay, achieving energy savings of ~40 %. Reflective coatings and cool paint have been trialled to reduce rooftop temperatures by  $\approx 2^\circ\text{C}$ .

Dr Yuan Chao, Director of the NUS Urban Climate Design Lab, added: “Combatting climate change with efficient urban planning and careful design of living environments can help to reverse the effects of climate change for future generations.”



ST PHOTO: KUA CHEE SIONG



### The Road Ahead: Planning Imperatives

Moving forward, Singapore must deepen its integration of climate resilience into every layer of urban planning policy and practice. The Draft Master Plan 2025 already signals a shift toward future-proofing land use by factoring in coastal protection zones, safeguarding critical infrastructure, and promoting adaptive urban design. Building on this, the **Coastal-Inland Flood Model** being developed by PUB can be spatially aligned with URA's zoning decisions to inform flood-resilient developments. The **Land Use Plan 2030** and the **Green Building Masterplan** can be updated to embed more stringent heat mitigation requirements—such as mandatory green roofs, district-level urban cooling, and high-albedo materials in key growth areas like Tengah and the Greater Southern Waterfront.



PHOTO: RAMBOLL

Industry has also reacted to the need for more climate resilient planning integrated into their projects. For example, the team at Ramboll has actively contributed to several projects in Singapore, including Jurong Lake Gardens and Bidadari Park. These projects exemplify the integration of nature-based solutions into park spaces to combat climate-related challenges. Jurong Lake Gardens includes bioswales designed to detain stormwater and manage the increased frequency of heavy rainfall events. The garden features Neram Stream, which transformed from a concrete drain into a naturalized series of streams leading to the lake. Bidadari Park utilizes a picturesque detention pond to regulate flows to the downstream drainage system, serving as a beautiful park anchor that allows people and nature to thrive together.

Ramboll's Head of Water and Climate Adaptation, Pritha Hariram mentioned that: "One of the biggest challenges in cross-sector coordination and public engagement for climate adaptation and mitigation in Singapore is aligning the priorities and actions of various stakeholders, including government agencies, businesses, and the community. More effective communication and outreach efforts are needed, as well as fostering public awareness and encouraging community participation in sustainability initiatives is crucial. Building a shared vision and promoting active involvement from all sectors will be essential in overcoming these challenges and ensuring a resilient and sustainable future for Singapore."

The Singapore Institute of Planners (SIP) can play a catalytic role by upskilling practitioners in climate-adaptive planning, facilitating cross-disciplinary collaborations, and shaping professional guidelines to operationalize resilience at precinct and city scales.



PHOTO: SIP led workshop for the Reimagining Sembawang Masterplan with URA and collaborators

In parallel, the Urban Redevelopment Authority (URA) as well as relevant agencies like PUB, leverage a sophisticated suite of digital tools and platforms to plan the city and manage issues associated with climate change. Digital tools such as urban digital twins—pioneered in Punggol and Jurong—should be expanded across districts to simulate climate stressors and guide responsive infrastructure design. Crucially, agencies must continue engaging communities, the private sector, and professional bodies to co-develop solutions that are not only technically sound but also socially inclusive and economically viable. Singapore's compact urban form, robust planning culture, and whole-of-government approach provide a strong foundation—but addressing climate change will require sustained innovation, collaboration, and policy evolution to ensure a truly climate-resilient future.

## Conclusion

Singapore's climate impacts—from rising seas to intensifying heat—demand an evolution in how the city is built and governed. Current tools, including coastal infrastructure, green plan initiatives, and the Draft Master Plan 2025, lay essential foundations. But to stay ahead, Singapore must turbo-charge resilience: combining green infrastructure, cutting-edge tech, stronger regulations, and public co-creation. If it succeeds, Singapore can emerge not just as a densely built metropolis, but as a truly climate-ready, thriving, and liveable City in Nature. SIP will further explore such issues in greater depth through a Knowledge Product to be published early next year.