

\$3.8m in funding for three projects to boost Singapore's defences against rising tides

Project that looks at rare but catastrophic events in warming climate among them

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Three new research projects have been awarded \$3.8 million in funding under the National Sea Level Programme, with findings expected to boost Singapore's preparedness against the rising tides.

The projects will study various aspects of the phenomenon by looking at factors that could have driven sea-level rise in the past, the current situation, and projecting what the future could be like.

A spokesman for the Meteorological Service Singapore (MSS), which is administering the programme, told *The Straits Times* that observational data will fill gaps in the understanding of past and present sea-level rise in Singapore and the region.

"Data from models will also help build a more complete picture on future changes in sea-level rise and its impact for Singapore and the region," added the MSS spokesman.

The MSS is under the National Environment Agency.

Global mean sea-level rise experienced today is driven primarily by a warming climate. Water expands when heated, causing sea levels to rise. At the same time, land ice is melting and adding to water in the oceans.

But there are other factors that could affect how high the waters go in a particular location.

For instance, since sea levels are relative to land, they can go up because the sea surface rises, or because the land sinks.

This is the situation in Jakarta. The Indonesian capital is sinking by between 1cm and 15cm a year

and almost half the city sits below sea level, the BBC reported in 2018.

Indonesia had announced plans to relocate the capital to Kalimantan but these plans have been put on hold because of the coronavirus pandemic.

One of the three new projects will use satellite data to monitor where and how fast the land is sinking in coastal cities around Southeast Asia, to build the most accurate map of land heights possible.

Said the MSS spokesman: "Estimating which areas will be flooded... requires a detailed map of current ground heights, so that the location of the low-lying areas that will in future fall below the current sea level are identified."

This project is led by Associate Professor Emma Hill from the Nanyang Technological University's (NTU) Earth Observatory of Singapore.

Another project led by Dr Bijoy Thompson from the National University of Singapore's Tropical Marine Science Institute will use satellite and tide gauge data, as well as regional ocean models, to look at how sea levels in the region have changed.

The third project, by NTU's Associate Professor Chew Lock Yue, will focus on extreme events in a warming climate.

The \$10 million National Sea Level programme was launched in 2019. The first two projects received \$2.7 million in funding last November.

Prof Chew said unabated warming could cause sea levels to go up rapidly, and cause extreme weather patterns – such as longer monsoon surges – to become more common.

Higher sea levels, coupled with more frequent storms and more intense rainfall, could cause extreme flooding events.

Prof Chew said: "It is important for Singapore to understand tail-end events because although such events are rare, their impact can be both costly and catastrophic. It is necessary for us to be prepared for such events based on a correct scientific understanding."

Tail-end events are so called because they are considered to have a low probability of happening. But if they do occur, they could have disastrous consequences.

Asked what was Singapore's stance on preparing for such events, Ms Hazel Khoo, director of national water agency PUB's coastal protection department, said the Government will continually review Singapore's long-term coastal protection needs based on the latest science.

"We are aware of such... tail-end events and will consider these scenarios carefully because extreme predictions are highly uncertain," she said.

Singapore's approach to dealing with such uncertainties is to come up with coastal protection plans that are flexible, she said. "This allows us to take adequate steps to address the more certain and nearer-term risks, yet at the same time allow accessibility to future options that cater to a range of probable events."

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