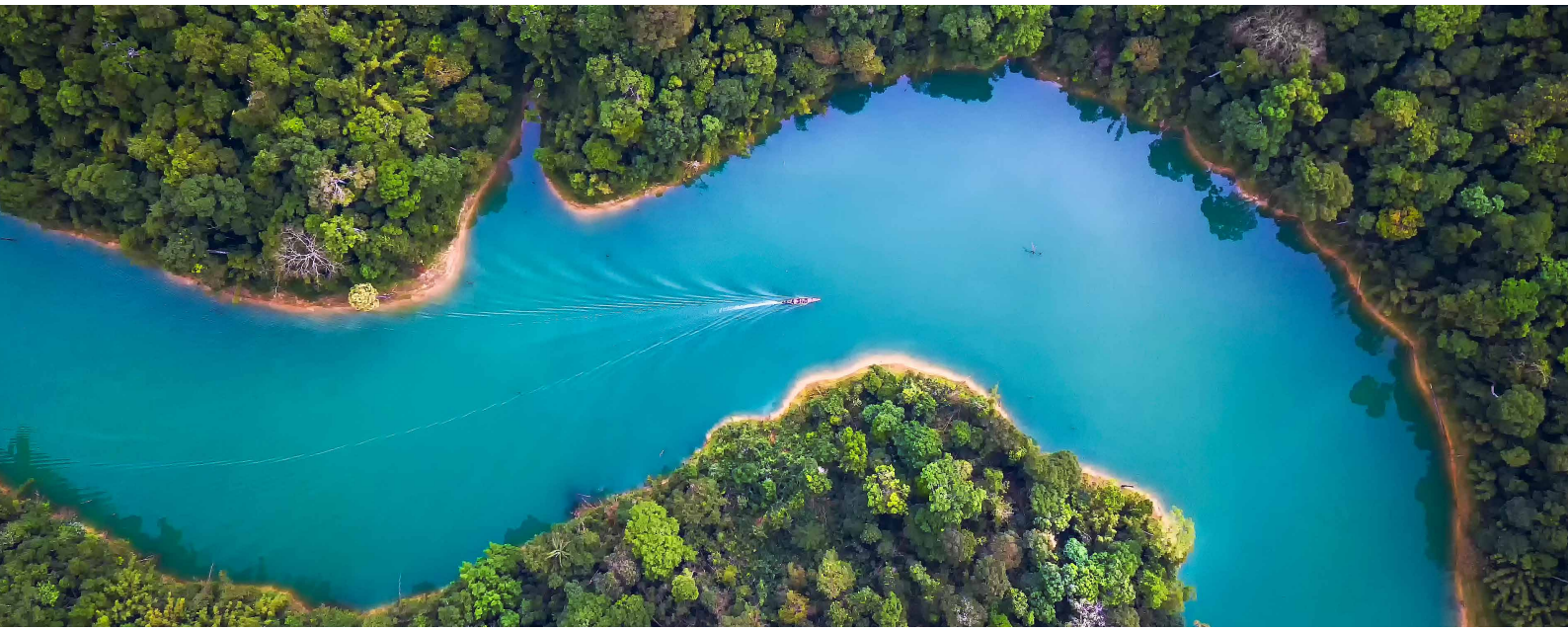
S&P Global

KAsset

Report by S&P Global Sustainable1

September 2026



The projected financial cost of climate change physical hazards for Thailand's listed companies

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Foreword

Foreword by KBank

By Wichai Narongwanich, Ph.D., FRM, CFA, SCR, First Senior Vice President, Corporate Strategy and Innovation Division, KASIKORNBANK PCL (KBank)

At KBank, we regard climate change not only as an environmental challenge, but as one of the defining strategic and economic issues of our time. It is reshaping risk, competitiveness and long-term value creation across sectors, markets and communities. As a leading financial institution in Thailand, KBank believes it has both the responsibility and the opportunity to help advance the country's sustainability agenda by integrating climate considerations into strategy, risk management and business development. This report brings the issue into sharp focus. By quantifying the growing physical climate risks facing Thailand's leading companies and communities, it underscores the urgency of moving decisively from awareness to action. For KBank, climate resilience is not a peripheral sustainability matter; it is an integral part of how we steward risk, allocate capital and support the transition toward a more resilient and sustainable economy.

KBank has long sought to play a leadership role in advancing sustainable finance and supporting customers through the evolving climate landscape. This requires not only strengthening climate risk analytics and embedding resilience into decision-making, but also providing clients with solutions that address both adaptation and mitigation. It further requires identifying new avenues for growth in areas such as sustainable finance, climate technologies and innovative services that help businesses and households prepare for a more volatile future. Our ambition is not merely to respond to climate risk, but to help shape the pathways through which resilience, innovation and responsible finance can contribute to Thailand's long-term prosperity. We hope this report will contribute meaningfully to the dialogue among business leaders, investors and policymakers, and support collective action to build a more resilient, inclusive and future-ready economy.

Foreword by KAsset

By Thidasiri Srisamith, CFA, Chief Investment Officer - Sustainable Investment, Kasikorn Asset Management Co., Ltd. (KAsset)

Climate change has become a significant investment risk, with impacts that are increasingly visible, severe, and disruptive to communities, supply chains, and business operations. At KAsset, we view climate change not only as a sustainability concern but also as a financial and business risk that should be assessed alongside other key drivers of investment risk and return. Climate change can manifest in several forms of physical risk, affecting asset values, earnings stability, capital expenditure requirements, insurance costs, and the long-term competitiveness of companies. In Thailand, where economic activity, infrastructure, and communities are exposed to a range of climate hazards, understanding these risks is essential for prudent investment management.

We believe that robust climate-related data and analysis are critical to supporting our informed investment decisions and more effective stewardship. Climate risk assessment helps translate scientific projections into actionable financial insights that can be incorporated into portfolio monitoring, risk management, and engagement with investee companies. By encouraging companies to improve disclosure, strengthen adaptation planning, and invest in resilience, investors can play an important role in supporting a more resilient capital market and economy.

This research article by S&P Global Sustainable1 provides timely insights into the potential financial implications of climate risks for Thailand's listed companies. Its findings highlight the importance of moving from awareness to action by identifying location-specific risks, integrating climate considerations into corporate strategy, and developing practical adaptation measures. KAsset is pleased to support this important discussion and remains committed to advancing responsible investment practices that seek to create sustainable long-term value for clients, investee companies, society, and the environment.

Key takeaways

- Companies in the SET100 index face nearly $11 billion in projected annual financial impact from climate physical risks in the 2050s (2050-2059) under a medium climate change scenario (SSP2-4.5), in the absence of adaptation measures, a new analysis using the S&P Global Sustainable1 Climate Physical Risk dataset finds.
- The top physical climate hazards for large companies in Thailand are extreme heat, water stress, drought and pluvial flooding, which is driven by extreme precipitation.
- In southern Thailand, approximately 17% of single-family homes are at risk of being affected by a 100-year fluvial or river flood event in the 2050s, according to S&P Global's high-resolution climate risk flood projections. Fluvial flooding occurs on an almost annual basis in the country. We look at fluvial flooding risk to Southern Thailand in particular because nearly a year ago, in November 2025, multiple days of heavy rainfall triggered severe surface water (pluvial) flooding as well as fluvial flooding across nine provinces in the region that affected 2.8 million people.
- 65% of the companies covered in this analysis of SET100 companies have plans to adapt to physical climate risks, according to data from the S&P Global Corporate Sustainability Assessment.

Executive summary

Major companies in Thailand could face billions of dollars in annual physical climate change costs over the next few decades in the absence of adaptation measures, according to a new analysis by S&P Global Sustainable1.

The analysis applies the S&P Global Sustainable1 Climate Physical Risk dataset to companies in the SET100 index, identifying a projected $10.9 billion in annual financial impact from climate physical risks in the 2050s (2050-2059) under a medium climate change scenario (SSP2-4.5) without adaptation measures. That number is up from $6.9 billion in annual costs in the 2030s and about $5.0 billion in projected annual costs in the 2020s.

Importantly, data from the S&P Global Corporate Sustainability Assessment (CSA) finds most SET100 companies do have climate adaptation plans that could help them avoid some of the costs of these climate hazards. The Case Study section of this report leverages new high-resolution flood data from S&P Global Sustainable1 to explore how flooding of different depths could impact single-family homes in southern Thailand.

The SET100 is an index of the 100 largest market capitalization securities traded on the Stock Exchange of Thailand.[1] This report covers the physical climate risks of 84 companies in the SET100 that collectively represent about 97% of the total market cap of the index.

This analysis identifies the most material physical risks of climate change for companies in the SET100 and quantifies those risks in financial terms. We find that extreme heat, water stress, drought and pluvial flooding driven by extreme precipitation are the top physical climate hazards for these companies.

1. SET100. 'SET100 Index.' https://www.set.or.th/en/market/index/set100/overview

Key terms

Corporate Sustainability Assessment (CSA): The CSA is an annual evaluation of the sustainability practices of more than 13,000 companies globally. It captures more than 3,500 data points across nearly three dozen environmental, social, governance and economic topics.[1] The analysis in this report is based on the 2025 CSA.

Drought: In basic terms, drought is an extended period with deficient precipitation that leads to water shortages. Drought identifies the climatic water balance and considers changes in precipitation and evapotranspiration driven primarily by temperature. Drought is modeled using the 12-month Standardized Precipitation Evapotranspiration Index (SPEI-12) and expressed as the fraction of days falling below the local historical 10th percentile of SPEI-12.

Extreme heat: Extreme heat is defined as the fraction of days exceeding the local historical 90th percentile of daily maximum temperature.

Fluvial flooding: This is a form of climate hazard known as river flooding where the water levels of rivers overflow their banks. The fluvial-basin flooding model includes flooding from streams and natural water-flow networks within the basin in which an asset is located.

Pluvial flooding: Pluvial or surface water flood is driven by extreme precipitation resulting in accumulation of water on land (particularly in low-lying areas), independent of rivers, lakes or oceans.

Water stress: This is an indicator of competition for water resources and is defined as the ratio of demand for water by human society divided by available water supply.

Single-family homes: Single-family homes for this analysis are defined as all buildings that are less than or equal to two floors and have a gross building area between 120 to 400 square meters.

Medium climate change scenario (SSP2-4.5): This scenario assumes strong mitigation of greenhouse gas emissions resulting in global average temperatures rising by 2.7 degrees C (2.1 degrees C-3.5 degrees C) by 2100. S&P Global has estimated there is a 50% likelihood that the global average temperature increase will exceed 2.3 degrees C by 2040, indicating that SSP2-4.5 is a useful approximation of the likely outcome of current climate policies.

Return period: This term refers to the annual probability that a flood of a specific depth or greater will occur in a specific location in a given year. This report looks at how single-family homes in southern Thailand could be impacted by floods of the depth of a 20-year return period and a 100-year return period, also known as a 20-year flood depth and 100-year flood depth, respectively.

Floods with a higher return period have less probability of occurring within a given year. For example, a 20-year flood depth has a 5% chance of being exceeded in a single year whereas a 100-year flood depth has a 1% chance of being exceeded in a given year. The 100-year flood depth is often considered the benchmark for flood defense design, and so in regions where climate change increases the frequency of deeper floods, the chances of historically projected structures becoming inundated by overtopping of defenses increases. For example, flood depths associated with a 1-in-100 year flood event are projected to become more common in many regions as the world warms.

SET100: This is an index of the 100 largest market capitalization securities traded on the Stock Exchange of Thailand. This report covers the physical climate risks of 84 companies in the SET100 that collectively make up 97% of the total market cap of the index. The analysis of CSA data on corporate climate adaptation practices covers 79 companies that collectively make up 86% of the total market cap of the SET100.

1. S&P Global Sustainable1. 'ESG Scores and Raw Data.'
https://www.spglobal.com/sustainable1/en/solutions/esg-scores-data#methodology-and-resources

Introduction

Torrential rainstorms, sweltering heat, destructive floods, raging wildfires and persistent droughts — these climate hazards are increasing in frequency and intensity as the world warms. Torrential rainstorms, sweltering heat, destructive floods, raging wildfires and persistent droughts — these climate hazards are increasing in frequency and intensity as the world warms. These events pose financial risks to economies, businesses and communities.

A September 2025 report by the Organisation for Economic Co-operation and Development (OECD) found that global warming is already causing a 1.75% reduction in annual global GDP output.[2] Looking ahead, the OECD found that under a business-as-usual climate scenario without investments in adaptation, cumulative output losses amount to about 4% of global GDP by 2050, with the South Asia and Sub-Saharan Africa regions affected the most.

S&P Global has previously found that the total cost of climate physical risk for the world's largest companies that make up the S&P Global 1200 index is projected to reach $1.2 trillion annually by 2050 under a medium climate change scenario, in the absence of adaptation measures.[3]

For companies operating in Thailand, the climate risks may be higher than in some other countries. Thailand is ranked No. 17 out of 174 countries on the Germanwatch 2026 Climate Risk Index[4] for countries most affected by extreme weather events in 2024, the most recent year for which data is available.

The costs of climate change will grow without steps to adapt to its impacts and reduce greenhouse gas emissions, which are driving up global temperatures. 2025 was one of the three warmest years on record at about 1.43 degrees C above preindustrial levels, nearing the Paris Agreement's warming threshold of 1.5 degrees, the World Meteorological Organization (WMO) said in its State of the Global Climate 2025 report.[5] S&P Global has projected that by 2040 the world is very likely to exceed 1.5 degrees C and could surpass 2.3 degrees C above pre-industrial levels by that date.[6]

This creates a clear need for investments in both mitigation to reduce greenhouse gas emissions and climate adaptation measures to slow the pace of climate change and ensure companies' operations and supply chains remain resilient.

2. Organisation for Economic Co-operation and Development. Sept. 4, 2025. 'OECD global long run economic scenarios. 2025 Update.' https://www.oecd.org/en/publications/oecd-global-long-run-economic-scenarios_00353678-en/full-report/component-3.html#chapter-d1e111

3. S&P Global Sustainable1. March 10, 2025. 'For the world's largest companies, climate physical risks have a $1.2 trillion annual price tag by the 2050s.' https://www.spglobal.com/sustainable1/en/insights/special-editorial/ceraweek-physical-risk

4. Germanwatch. November 2025. '2026 Climate Risk Index.' https://www.germanwatch.org/sites/default/files/2025-11/CRI%2026%20full%20report.pdf

5. World Meteorological Organization. March 23, 2026. 'State of the Global Climate 2025.' https://wmo.int/publication-series/state-of-global-climate/state-of-global-climate-2025

6. S&P Global Ratings. September 15, 2025. 'Sustainability Insights: Why Planning For A 2.3°C Warmer World Is Critical This Decade And Next.' https://www.spglobal.com/ratings/en/regulatory/article/sustainability-insights-why-planning-for-a-23c-warmer-world-is-critical-this-decade-and-next-s101644796

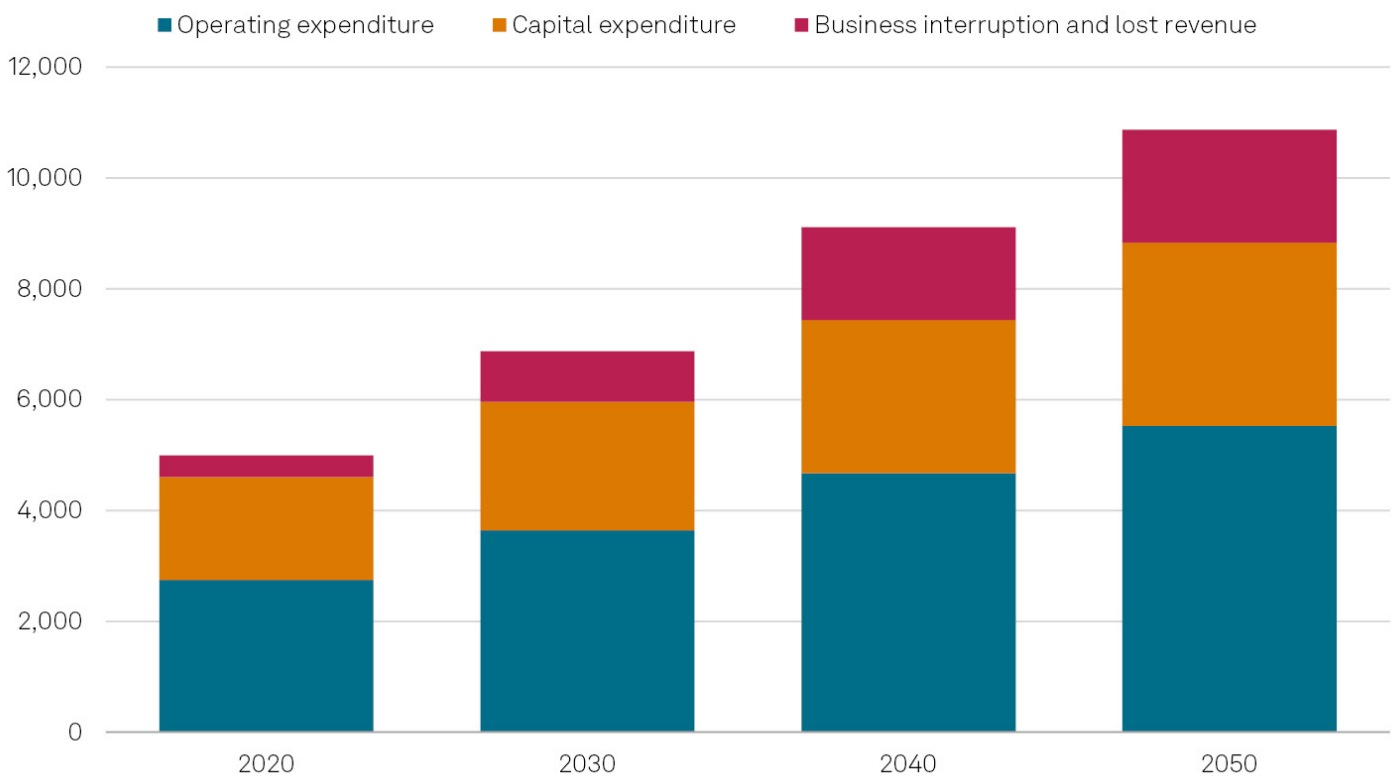
SET100 companies face billions of dollars in climate change costs

The S&P Global Sustainable1 Physical Risk dataset models how the physical risks of climate change flow through to companies as financial impacts. The combined annual cost of climate hazards for companies reviewed in this analysis that are in the SET100 is projected to more than double from about $5.0 billion in the 2020s to $10.9 billion annually in the 2050s, without adaptation measures.

The majority of these costs (about 51%) are projected to appear as higher operating expenses in the 2050s, including increased electricity demand for cooling facilities, higher maintenance costs and rising insurance premiums in climate-exposed areas. The remaining financial impact is expected to come through higher capital expenditure associated with repairing or upgrading damaged infrastructure and equipment, as well as revenue losses linked to business interruption, supply chain disruption and reduced productivity.

Operating expenditures account for about half of climate physical risk financial impacts for largest companies in Thailand

Total annual financial impact on SET100 companies under the SSP2-4.5 climate change scenario in the 2050s ($M)



As of April 27, 2026.

No inflation assumptions are applied and results are presented in nominal 2024 prices. Financial impact represents annual average cost over each decade. Financial impact combines both chronic, year-over-year pressures and acute conditional losses under elevated hazard scenarios. In reality, realized costs will vary from year to year depending on whether and how severely events materialize.

Chart reflects the 84 constituents in the SET100 index included in this analysis.

Source: S&P Global Sustainable1.

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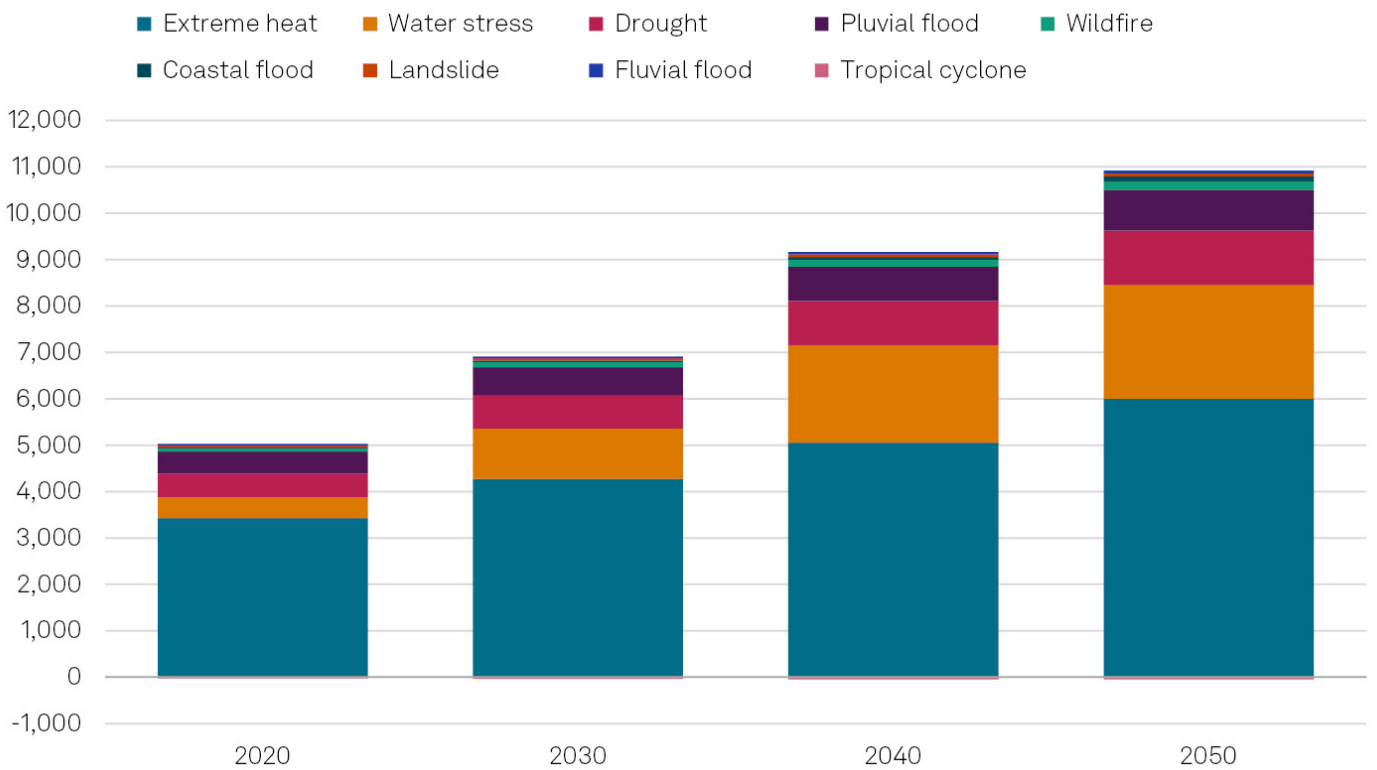
Top climate physical risks

Over the coming decades, our analysis projects that extreme heat will be the biggest physical climate risk for SET100 companies. Extreme heat is defined as the fraction of days exceeding the local historical 90th percentile of daily maximum temperature. Extreme heat will account for more than half of these companies' costs from physical climate risk from the 2020s through the 2050s.

Some of the factors that S&P Global Sustianable1 includes in its financial impact methodology for extreme heat include the increased use of cooling equipment to maintain optimal temperatures for employees and/or equipment, and costs associated with reduced employee productivity. The methodology also considers excess costs associated with reduced operating lifespans for cooling systems (HVAC) due to increased operation in response to rising temperatures.

Extreme heat is the top climate physical risk for Thailand's largest companies

Total annual financial impact on SET100 companies under the SSP2-4.5 climate change scenario in the 2050s ($M)



As of April 27, 2026.

No inflation assumptions are applied and results are presented in nominal 2024 prices. Financial impact represents annual average cost over each decade. Financial impact combines both chronic, year-over-year pressures and acute conditional losses under elevated hazard scenarios. In reality, realized costs will vary from year to year depending on whether and how severely events materialize.

Chart reflects the 84 constituents in the SET100 index included in this analysis.

Source: S&P Global Sustainable1.

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In addition to posing health risks — particularly to the young, elderly and outdoor workers — periods of extreme heat can slow economic productivity, kill crops, damage critical infrastructure and accelerate environmental degradation.

A 2025 article published in the journal Scientific Reports found that life-threatening heat extremes in Southeast Asia will become the norm.[7] Under the historical baseline for the study, people in Southeast Asia experienced at least very strong heat stress for about 88 days per year. Under RCP2.6 climate scenario, which is characterized by low greenhouse gas emissions, very strong heat stress is expected to occur for 119 days per year. The RCP2.6 scenario contemplates strong efforts to mitigate climate change and a two in three chance of limiting global warming to below 2 degrees C by 2100. The report notes that Myanmar, Thailand and Vietnam face the biggest increase in heat stress exposure in the near future.

Extreme heat in South Asia, including in Thailand, during the pre-monsoon season is already becoming more frequent.[8] In April and May 2024, for example, a prolonged heatwave in the country drove temperatures above 40 degrees C in 26 provinces and caused more than 60 heat-related deaths, according to the UN's Asia-Pacific Disaster Report 2025.[9]

Water stress makes up almost a quarter of all climate hazard costs

Water stress is the second biggest physical climate risk our analysis identifies for large companies in the SET100. It is projected to account for 23% of the group's annual physical climate risk costs in the 2050s, up from about 9% in the 2020s.A surge in new data centers to meet AI demand could further tax Thailand's water stress levels, according to some media reports.[10]

Drought, which can contribute to water stress, is the third largest physical climate risk to companies in this analysis, accounting for between 10% to 11% of total annual climate hazard-related costs from the 2020s through the 2050s.

Drought is a particular problem for the agriculture sector and can impact crop yields and food production, including rice crops. Close to half (46.5%) of all Thailand's land area is used for agriculture and the country is one of the largest exporters of rice globally. Rice requires large amounts of water for irrigation given that traditional growing methods involve flooding rice fields with water.

The fourth biggest risk we identified for companies in this analysis is pluvial flooding caused by intense and prolonged rainfall. Thailand is among the 10 most flood-prone countries globally, according to a World Bank 2025 Thailand Country Climate and Development report.[11] The report notes that riverine (fluvial) floods occur on an almost annual basis, typically toward the end of the monsoon season, which lasts from July to October.

7. Scientific Reports. Dec. 29, 2025. 'Widespread heat stress will become the norm in a warming Southeast Asia.' https://pmc.ncbi.nlm.nih.gov/articles/PMC12756238/

8. World Weather Attribution. May 14, 2024. 'Climate change made the deadly heatwaves that hit millions of highly vulnerable people across Asia more frequent and extreme.' https://www.worldweatherattribution.org/climate-change-made-the-deadly-heatwaves-that-hit-millions-of-highly-vulnerable-people-across-asia-more-frequent-and-extreme/

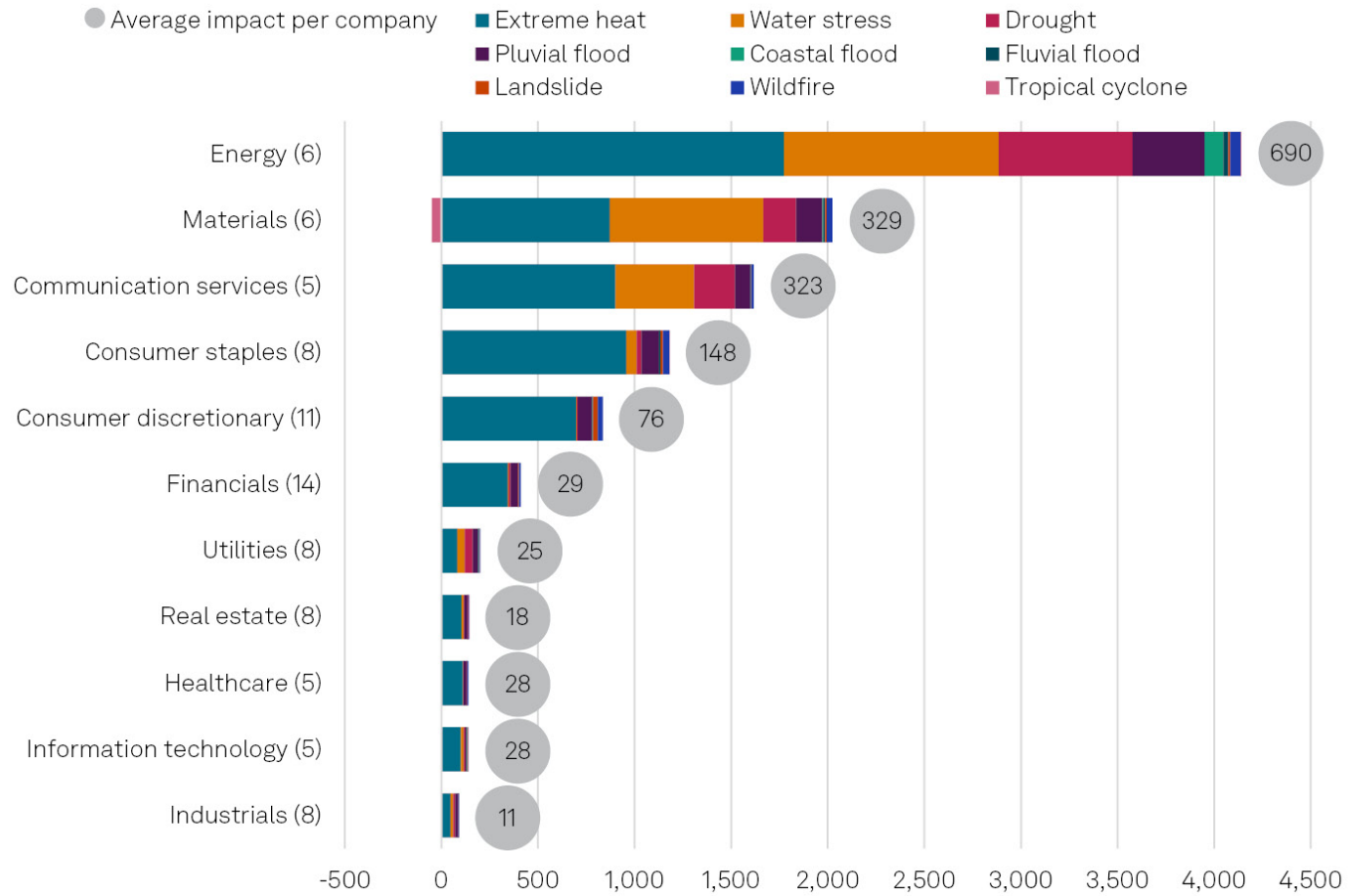
9. United Nations Economic and Social Commission for Asia and the Pacific. Nov. 26, 2025. 'UN warns of rising heat risks in Asia and the Pacific.' https://www.unescap.org/news/un-warns-rising-heat-risks-asia-and-pacific

10. Mongabay. April 8, 2026. 'AI infrastructure growth threatens water-stressed Thai regions.' https://news.mongabay.com/short-article/2026/04/ai-infrastructure-growth-threatens-water-stressed-thai-regions/

11. World Bank Group. Oct. 3, 2025. 'Thailand Country Climate and Development Report.' https://www.worldbank.org/en/country/thailand/publication/th-ccdr

Energy companies face the biggest climate physical risk of all sectors

Total annual financial impact on SET100 companies under the SSP2-4.5 climate change scenario in the 2050s ($M)



As of April 27, 2026.

No inflation assumptions are applied and results are presented in nominal 2024 prices. Financial impact represents annual average cost over each decade. Financial impact combines both chronic, year-over-year pressures and acute conditional losses under elevated hazard scenarios. In reality, realized costs will vary from year to year depending on whether and how severely events materialize.

Chart reflects the 84 constituents in the SET100 index included in this analysis.

Source: S&P Global Sustainable1.

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On a sectoral basis, our analysis finds that energy companies in the SET100 face the largest financial costs from physical climate risk. Energy companies in that sector could face $4.1 billion in annual costs due to climate hazards in the 2050s, according to our projections. That translates into a projected average annual financial impact of approximately $690 million per energy company in the 2050s — or about 7% of the total market cap of all companies in the sector (in 2026 figures).

The materials, communication services and consumer staples sectors would each face at least $1 billion in annual costs from climate physical risks by 2050 — or about 9% of the total market cap of the companies in the materials sector, 3% of the total market cap for communication services, and 5% of the total market cap for consumer staples (in 2026 figures). The average annual impact per company in the materials sector is projected at approximately $329 million. This average per company is about $323 million per communication services company, while the average cost per company for consumer staples would be nearly $148 million.

Corporate climate adaptation plans

The projected costs of climate change hazards for companies in Thailand represent a baseline of risk and do not reflect existing or planned adaptation measures. Taking action to harden corporate assets and operations against climate hazards could lower the projected costs.

Climate mitigation and climate adaptation are two key prongs of a comprehensive climate strategy. In simple terms, mitigation refers to human intervention to reduce emissions or enhance the sinks of greenhouse gases. Delays in climate mitigation mean the world is warming, which is contributing to more frequent and severe climate hazards.

As a result, in 2026, companies and communities are putting more focus on adaptation, or measures to prepare for and adjust to current and future climate change impacts. Adaptation can take many forms based on an area's terrain, weather conditions and economic strength, as well as the physical climate hazards that pose the greatest threat to an asset.

Examples of climate adaptation are already widespread across the public and private sectors. In Thailand, the Green Climate Fund is collaborating with the government and private and public financial institutions to build climate resilience for farmers in the Yom and Nan river basins.[12] And the Bangkok Metropolitan Administration has worked to establish cooling shelters, expand green spaces — including through a new network of small neighborhood parks — and set up heat alert systems in response to increasingly severe and lengthy heatwaves.[13]

Prior S&P Global research has shown that returns on adaptation and resilience investments can be significant. For the nonresidential real estate sector, for example, an analysis S&P Global Sustainable1 conducted with Singapore-based GIC estimated that the timely implementation of wet and dry floodproofing could save $3.55 for each dollar invested, and green and cool roofs could save $7.45 per dollar invested.[14]

For companies, the most effective adaptation and resilience measures will account for the type of asset and the specific climate conditions of the local area. The S&P Global CSA evaluates a wide range of sustainability practices at the company level, including whether a company has an adaptation plan, and if that plan considers the specific context of a company's operations.

An "overall" corporate adaptation plan refers to a company reporting on relevant climate physical risks and the actions it is taking to address them in general, while a stronger "context-specific" adaptation plan describes how a company will adapt to risks based on the location, vulnerabilities and other attributes of its operations. A context-specific plan integrates physical and nonphysical measures aimed at reducing — to the extent possible and on a best-efforts basis — all material physical risks identified by a company. Adaptation plans as defined in the CSA are the result of a detailed climate physical risk assessment.

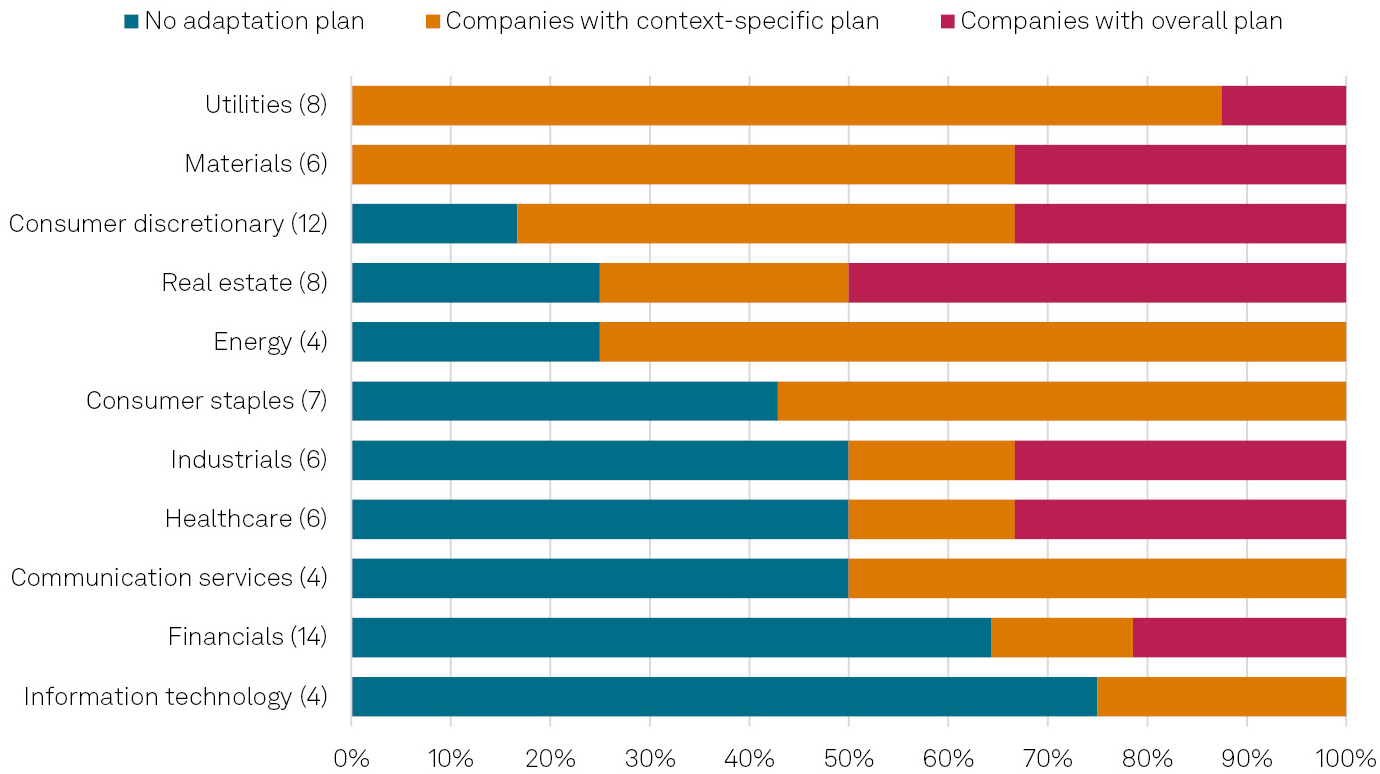
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12. United Nations Development Programme. 'Enhancing Climate Resilience in Thailand through Effective Water Management and Sustainable Agriculture.' https://www.adaptation-undp.org/projects/enhancing-climate-resilience-thailand-through-effective-water-management-and-sustainable

13. World Bank Group. March 26, 2025. ' World Bank and Bangkok Metropolitan Administration Highlight Ways to Strengthen Resilience amid Rising Heat Crisis.' https://www.worldbank.org/en/news/press-release/2025/03/26/world-bank-and-bangkok-metropolitan-administration-highlight-ways-to-strengthen-resilience-amid-rising-heat-crisis

14. GIC and S&P Global. September 2024. 'Integrating Climate Adaptation into Physical Risk Models.' https://www.gic.com.sg/uploads/2024/09/Integrating-Climate-Adaptation-into-Physical-Risk-Models_SP_GIC_Final.pdf

Context-specific climate adaptation plans tend to be popular among most sectors



Data as of April 30, 2026.

Chart reflects 79 constituents of the SET100 index that were included in the 2025 S&P Global Corporate Sustainability Assessment (CSA).

This analysis includes companies that reported having adaptation plans in the 2025 S&P Global CSA.

Sources: S&P Global Sustainable1.

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A majority of the largest companies in Thailand — 65% of the SET100 constituents included in the 2025 S&P Global CSA — have a plan to adapt to physical climate risks in their operations.Adaptation plans are far more common among companies in the SET100 compared with the global average (36%).

And on a regional basis, the Asia-Pacific, including Thailand, has the largest share of companies with adaptation plans at 48%. By comparison, this number is 37% for companies in our analysis in Europe and in Latin America and the Caribbean; 17% for the US and Canada; and 6% for the Middle East (6%), according to data from the 2025 CSA.

Most companies in the SET100 with an adaptation plan use a context-specific one, although the practice is more common among some sectors, particularly utilities. Our analysis for Thailand covers 79 companies that collectively represent 86% of the total SET100 index market cap.

Examples of company adaptation planning and strategies across 3 sectors

- **Making utility assets more resilient to floods and water stress:** In its 2025 sustainability report, a utility in the SET100 said it integrates climate adaptation and resilience measures into its enterprise risk management framework and in project design and operating processes. The company said its biggest physical climate risks are flooding, drought and water stress that could disrupt operations, damage certain assets or increase operating costs.

  For flood risks, the utility is incorporating flood prevention measures at some facilities such as flood walls and raised platforms for major machinery. The company is also purchasing flood insurance covering estimated maximum loss based on 100-year flood data.

  The utility noted that most of its gas-fired projects in Thailand are in areas of high water stress, where demand from the projects represents 40% to 80% of water availability. In addition to having site-specific water stress mitigation strategies and performing annual monitoring, the utility is also establishing raw water storage ponds and increasing water cycling in cooling towers to reduce its risk exposure.

- **Consumer discretionary company on adapting to flood and extreme heat risks at retail stores:** In a 2025 ESG report, a home improvement and hardware retail company in the SET100 described using an enterprise risk management framework to identify physical climate risks and opportunities. The company identified flooding as a risk that can cause business disruption and delays in product transport and delivery to customers, damage to assets and increased repair and maintenance expenses. The company noted that it is investing in building upgrades to withstand floods, and estimated the cumulative impact of flooding could reduce the company's revenues by about 12% compared to normal conditions from 2026 to 2030.

  The company's climate adaptation plan includes providing water pumps to all stores, adding flood barriers at high-risk locations and elevating stores' platforms to at least 70 cm above road levels. The company also listed extreme heat as a risk that could drive up electricity costs by 13% by 2030 and impact the health and safety of associates and customers. The company also noted the risk that drought presents, and listed climate adaptation options including installing in-building energy control systems, adding thermal insulation in buildings, providing green areas, installing water-saving devices and assessing drought risk and water stress ahead of constructing new stores.

- **Health care company applies lessons learned from 2025 southern Thailand flood to improve disaster preparedness:** In its 2025 sustainability report, a health care company in the SET100 said it has applied lessons learned from the 2025 flooding event in southern Thailand to strengthen its understanding of physical risks and improve disaster preparedness measures for hospitals located in vulnerable areas. The company was directly impacted by the floods and described how it created a temporary field hospital after the floodwaters receded in the Hat Yai district to help provide relief to local communities free of charge.

  The company noted that climate change has intensified water-related challenges, including water scarcity, droughts and declining water quality. The company also said that a continuous supply of high-quality water is a critical sustainability issue for the health care sector and described its water management process to reduce consumption and improve wastewater treatment systems.

Case study: River flooding risk to single-family homes in southern Thailand

Fluvial or river flooding is one of many climate hazards expected to worsen because of human-caused climate change. About half of the world's population[15] lives within 3 km of a freshwater body, and for about 88% of people, that freshwater body is a river — making the prospect of more intense river flooding a widespread risk.

In this case study, we explore the projected climate change risk of fluvial flooding or river flooding to single-family homes across southern Thailand and at a sub-district level in that region. Flood depths of a 100-year return period are modeled for the current climate (the 2020s decade) and projected through the 2050s under a medium climate change scenario (SSP2-4.5) as an illustration of a potential outcome for the evolution of flood risk in the future. The sub-district level analysis also includes projected exposure to single-family homes at flood depths of a 100-year return period.

The total projected cost of property damage to single-family homes in southern Thailand could surpass $2.9 billion for a 100-year flood during the 2030s decade. Those costs are projected to increase to about $3.1 billion in the 2050s.

Of the more than 900,000 structures identified as single-family homes in southern Thailand, nearly 15% would face property damage during a 100-year flood in the 2030s. That figure would climb to nearly 17% of homes in the 2050s. We define "exposure" as the projection of a flood causing at least some physical damage (>$0) to the property.

Even a less severe flooding event, such as a 20-year flood, is projected to cause more than $1.6 billion in damage to single-family homes in southern Thailand in the 2030s decade, rising to $1.7 billion in property damage in the 2050s.

S&P Global Sustainable1's high-resolution climate projections of flood hazard are at the 30-meter scale. The flood model combines baseline, present-day probabilistic flood hazard and defense data from flood-modeling firm JBA Risk Management[16] with climate projections and interpretation from S&P Global Sustainable1. JBA also provides information on local and regional flood defense systems such as levees, and these measures are reflected in our projections of flood depths. Our projections of flood depth and potential damage reflect the current state of municipal and sub-district flood protection and make no assumptions about the effectiveness of future improvements to flood defenses.

Understanding flood exposure down to the level of individual buildings is critical because flood depths can vary widely over small areas. Many factors influence localized flood depth and the potential for property damage and business interruption beyond just proximity to the riverbank. These factors include terrain elevation, river current strength, vegetation and local weather patterns. Flood water 1 meter deep could cause material damage to a single-family home on a street facing a river during a flood, while a neighbor two houses away might only face flood depth of a few inches

15. PLoS One. June 2011. 'How close do we live to water? A global analysis of population distance to freshwater bodies.' https://pubmed.ncbi.nlm.nih.gov/21687675/

16. S&P Global. 2026. 'JBA Risk Management & S&P Global Energy Horizons Partnership.' https://www.spglobal.com/sustainable1/en/jba-risk-management-partnership

due to a change in elevation or flood defenses. Flood damage worsens with water depth and can vary significantly, from limited disruption to inundation or structural failure.

Having a high-resolution picture of flood risk at the building level is therefore key to many stakeholders, including companies with operations near rivers, investors with assets exposed to fluvial flooding and banks with residential and commercial real estate lending exposure.

Range of flood damage to buildings by flood depth

Flood depth	Potential impact
>1 meter	Material impact to structural integrity as the weight of floodwater creates hydrostatic pressure that risks building collapse or foundation damage.
0.5–1 meter	Material impact to operations as first floor may be inundated and electrical, communication and ventilation systems may be impacted.
0.1-0.5 meter	Damage to flooring, subfloor and property.
<0.15 meter	Flood water reaches the lower-floor level, causing minor nuisance damages and potential temporary disruption of access.

While flooding of any depth can create repair or cleanup costs, financial risk becomes more material at or above 0.5 meters, when damage to flooring, mechanical systems such as heating or air conditioning, or foundations becomes possible.

Our analysis identifies 43,869 single-family homes in southern Thailand that are projected to face at least 0.5 meters of flooding in the 2050s during a 100-year flood, or about 5% of the total. The number of materially at-risk homes from a 100-year flood is only slightly higher in the 2050s than in this decade (the 2020s) when 42,473 homes are at risk. These are structures that may fall outside the protection zone of flood management infrastructure, and additional flood defenses at the property level may be needed to limit financial risk.

Because this case study is limited to single-family homes, the damage estimates are inherently conservative and a snapshot of one aspect of flood risk to southern Thailand. The projected impact of a 100-year flood would inherently be higher when both fluvial and pluvial flood risks are modeled and if accounting for potential damage to other assets — commercial properties, agricultural assets, municipal infrastructure — as well as the cost of human displacement, injuries and deaths.

Fluvial flood damage projections: Hat Yai district

Floods can disrupt economic activity, displace people temporarily or permanently, and damage physical assets ranging from buildings to public infrastructure. For example, multiple days of heavy rainfall in late November 2025 across southern Thailand triggered severe flooding in nine provinces that affected 2.8 million people, caused 221 deaths and displaced more than 12,600 people; these figures are according to the Global Disaster Awareness and Coordination System,[17] a cooperation framework between the United Nations, the European Commission and disaster managers worldwide. The 2025 event marked the worst rainfall the region had seen in 300 years.[18]

River flooding is often caused by extreme precipitation. A large enough volume of rainwater can cause rivers to overtop their banks and flood the surrounding land.

17. Global Disaster Awareness and Coordination System. 'Event summary. Thailand floods update.' https://www.gdacs.org/report.aspx?eventid=1103621&episodeid=2&eventtype=FL

18. Dr. Non Arkara. Digital Economy Promotion Agency of Thailand. 'Thailand's Flood Crisis: A Plan for Recovery and Prevention.' https://www.researchgate.net/publication/398071113_Thailand's_Flood_Crisis_A_Plan_for_Recovery_and_Prevention

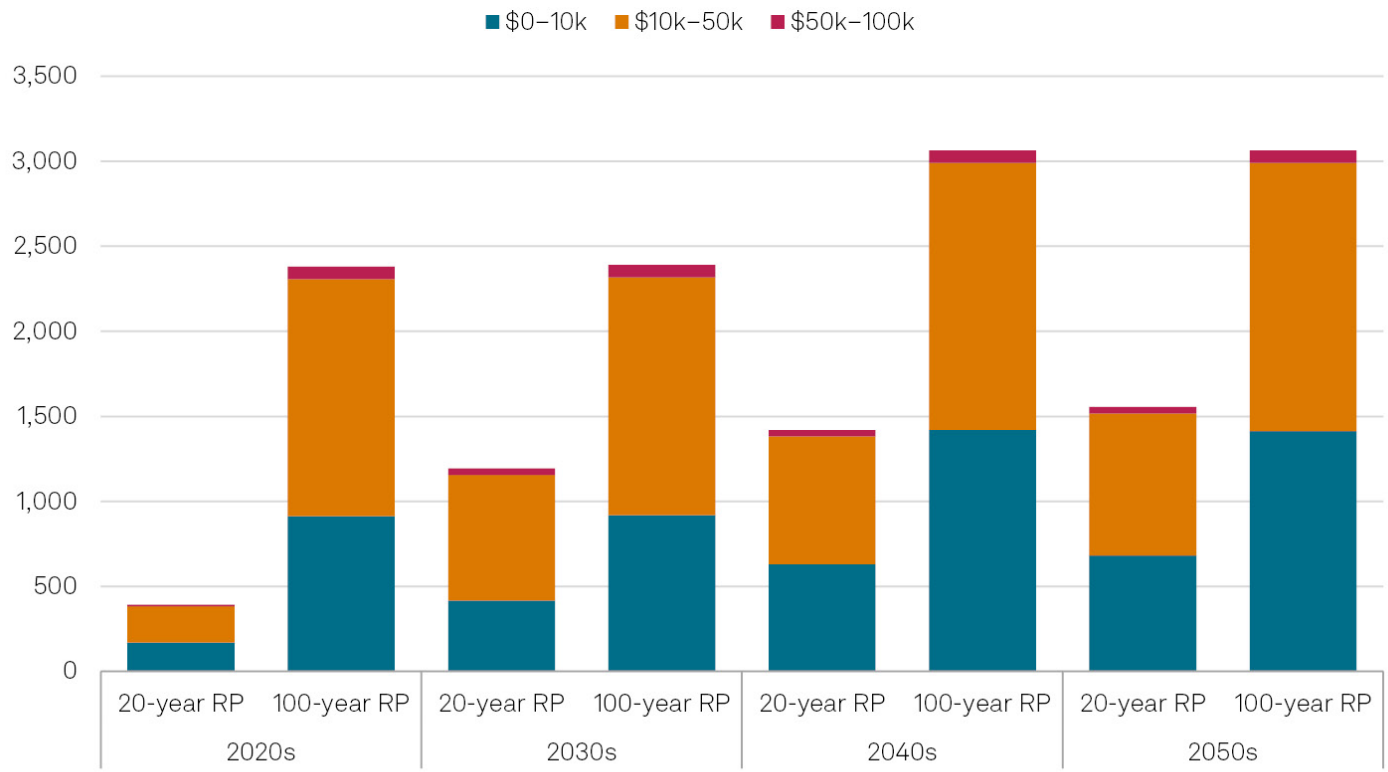
The flood projections presented in this analysis reflect river flooding, which may be caused by heavy rain. Pluvial flooding, or flood caused by rainwater that pools and reaches a potentially dangerous depth before it can be absorbed, is not reflected in these projections.

One area that was hard hit by the November 2025 flooding was Hat Yai, the largest city in southern Thailand and a major commercial hub for the region. Hat Yai city, which is part of Hat Yai district, is in a low-lying floodplain in the Khlong U-Taphao river basin, which can trap rainwater flowing toward the sea and Songkhla Lake and makes the city vulnerable to flooding.

Kasikorn Research Center at the time of the November 2025 floods estimated the initial impact would be at least 25 billion baht (US$776.3 million) over a one-month period, or about 0.13% of Thailand's nominal GDP.[19] The Songkhla Province, which includes the city and district of Hat Yai, was particularly impacted, the report found, with estimated costs that included the suspension of economic activities, industrial production and basic public utilities such as electricity and water. The report also noted that after the floodwaters receded, affected households would have to address property damage.

100-year flood could expose more than 3,000 Hat Yai homes to damage in the 2050s

Projected number of homes by fluvial flood damage in a 20-year flood and a 100-year flood over four decades, SSP2-4.5 scenario



As of May 15, 2026.

RP = return period.

Fluvial flooding for this analysis is a form of climate hazard known as river flooding where the water levels of rivers overflow their bank.

SSP2-4.5 is a medium climate change scenario that assumes strong mitigation of greenhouse gas emissions resulting in global average temperatures rising by 2.7 degrees C (2.1 degrees C-3.5 degrees C) by 2100.

Source: S&P Global Sustainable1.

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19. Kasikorn Research Center. Nov. 25, 2025. 'Flooding in Songkhla and several other southern provinces expected to cause at least THB 25 billion in economic losses.' https://www.kasikornresearch.com/en/analysis/k-econ/economy/Pages/TH-Flood-South-CIS3624-KR-25-11-25.aspx

To look more closely at what kind of damage a severe flood could cause to a major population area, we examined the flood model's projections for the Hat Yai district, which includes the city of Hat Yai. We identified and reviewed 22,216 structures defined as single-family homes in the Hat Yai district and explored how they might be impacted.

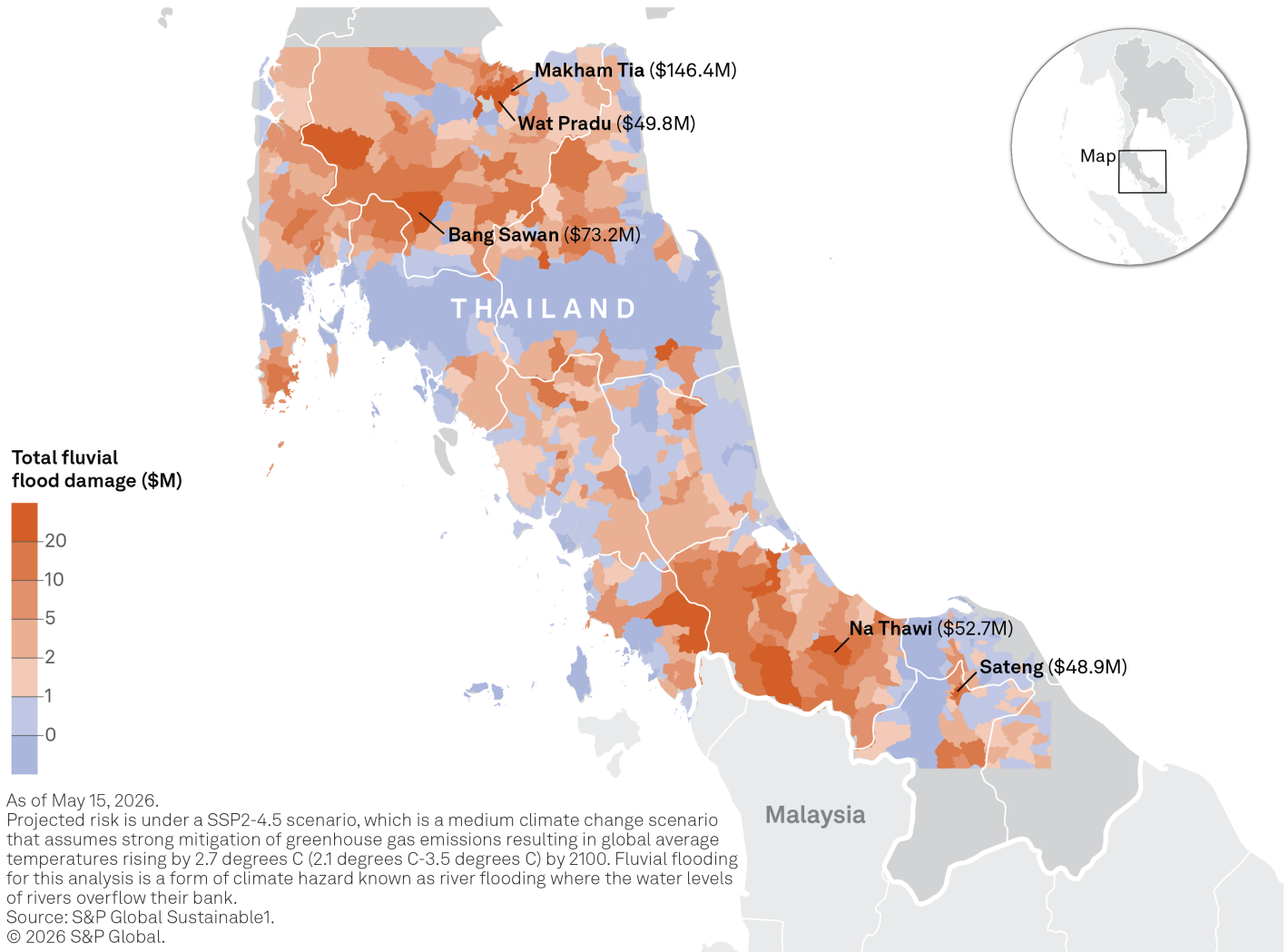
The chart above illustrates how 100-year floods, although they have only a 1% chance of occurring in a given year, are projected to be significantly more costly and impact more properties when they do happen. A 100-year flood during the 2050s is projected to affect 3,064 homes, or 13.8% of all homes in the district, whereas a 20-year fluvial flood, or one with a 5% annual chance of occurring, could cause damage to 1,554 homes, or only 7% of homes in the district. Furthermore, twice as many homes in the 100-year flood model would face between $50,000 to $100,000 in costs for their property than they would from a 20-year flood in the 2050s.

As for projected costs of a 100-year fluvial flood, the district of Hat Yai would face $185 million in damage to single-family homes in the 2030s, increasing to $203 million for such an event in the 2050s.

Top 20 sub-districts in southern Thailand with projected fluvial flood risk

The 20 sub-districts in southern Thailand most exposed to fluvial flood risk could face about $820 million in property damage to single-family homes from a 100-year flood in the 2050s, according to our projections.

Flood risk exposure in southern Thailand by subdistrict



As of May 15, 2026.
Projected risk is under a SSP2-4.5 scenario, which is a medium climate change scenario that assumes strong mitigation of greenhouse gas emissions resulting in global average temperatures rising by 2.7 degrees C (2.1 degrees C-3.5 degrees C) by 2100. Fluvial flooding for this analysis is a form of climate hazard known as river flooding where the water levels of rivers overflow their bank.
Source: S&P Global Sustainable1.
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Fluvial flood risks vary significantly at the sub-district level even among the ones facing the greatest climate impacts. For example, the sub-district with the highest projected total cost of property damage to single-family homes is Makham Tia with $146 million in projected costs and 4,932 homes at risk of being damaged during a 100-year flood in the 2050s. This is about twice the cost modeled for Bang Sawan, the sub-district with the second highest projected costs in a 100-year fluvial flood in the 2050s.

Top 20 sub-districts in Southern Thailand in total projected damage costs from 100-year fluvial flooding in 2050s

Province	Sub-district	Total fluvial flood damage ($M)	Number of homes affected ($>0–10k)	Number of homes affected ($10k–50k)	Number of homes affected ($50k–100k)
Surat Thani	Makham Tia	146.4	631	3,730	571
Surat Thani	Bang Sawan	73.2	79	473	74
Songkhla	Na Thawi	52.7	447	618	31
Surat Thani	Wat Pradu	49.8	33	1,253	193
Yala	Sateng	48.9	263	1,289	197
Surat Thani	Tha Kham	48.8	87	1,096	246
Songkhla	Prik	43.6	130	359	21
Songkhla	Khuan Lang	39.1	156	284	34
Songkhla	Kho Hong	36.7	573	475	14
Surat Thani	Bang Kung	34.7	446	1,188	75
Nakhon Si Thammarat	Cha-uat	34.3	40	270	16
Songkhla	Samnak Taeo	26.1	94	209	11
Satun	Khuan Sato	25.1	68	216	14
Satun	Thung Nui	24.8	65	214	13
Nakhon Si Thammarat	Chawang	24.5	24	231	71
Songkhla	Chang	24.0	121	245	21
Satun	Khuan Kalong	23.3	63	211	7
Songkhla	Khu Tao	22.8	424	427	15
Songkhla	Khlong Hae	21.3	260	391	11
Surat Thani	Khlong Sok	20.0	53	146	14
Grand Total		**820.0**	**4,057**	**13,325**	**1,649**

As of May 15, 2026.

Fluvial flooding for this analysis is a form of climate hazard known as river flooding where the water levels of rivers overflow their bank.

This analysis is for a medium climate change scenario (SSP2-4.5) that assumes strong mitigation of greenhouse gas emissions resulting in global average temperatures rising by 2.7 degrees C (2.1 degrees C-3.5 degrees C) by 2100.

Source: S&P Global Sustainable1.

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Conclusion

As the world warms, extreme weather events are becoming more frequent and severe. This comes with stark human and financial costs, as demonstrated by devastating flooding in southern Thailand in 2025. This report's review of fluvial flooding risk in southern Thailand finds that tens of thousands of single-family homes in the region could face further flood damage in the coming decades.

Across the full spectrum of climate risks, our analysis shows that climate change physical risk comes with a big price tag for companies, highlighting the role that adaptation measures can play alongside steps to reduce greenhouse gas emissions. Constituent companies of Thailand's SET100 index included in this analysis could face $6.9 billion in annual physical climate change costs in the 2030s, climbing to $10.9 billion in annual financial impact in the 2050s, according to projections from S&P Global Sustainable1. The majority of the costs in the 2050s are projected to come from higher operating expenses.

Data from the S&P Global Corporate Sustainability Assessment suggests there is further room for companies to develop comprehensive adaptation plans that factor in location, vulnerabilities and other operational details to reduce these future costs.

Financial institutions like KAsset increasingly recognize climate change as a financial and business risk to be measured and managed alongside other key drivers of investment risk and return. And KBank is working to advance sustainable finance and support customers through the evolving climate landscape. This requires not only strengthening climate risk analytics and embedding resilience into decision-making, but also providing clients with solutions that address both adaptation and mitigation.

Appendix

Methodology for identifying single-family homes and estimating building damage

We used the following approach to classify buildings as single-family homes:

- Building footprints were sourced from the Microsoft global building dataset derived from Bing Maps aerial imagery using deep learning classification.
- Buildings within a city were extracted and screened to identify single-family homes.
- Building height was used to estimate the number of floors, assuming a typical floor height of 3 meters.
- Buildings with two or fewer floors were classified as single-family homes. Where height information was unavailable, buildings were conservatively assumed to be single-family homes.
- Gross floor area was calculated as footprint area × number of floors, and buildings outside the typical size range for single-family homes were excluded.

Flood damage at the building level was estimated as follows:

- Flood depth values are extracted at each building location from flood hazard maps.
- Flood depth is converted into a fractional structural damage ratio using depth-damage functions for Asia from the Joint Research Centre.
- The fractional damage ratio is applied to the building's ground floor area to estimate the portion of the structure affected by flooding.
- The damaged floor area is multiplied by maximum structural damage cost expressed in $/m² to estimate the total structural loss.

Methodology for the Climate Physical Risk dataset

The S&P Global Sustainable1 Climate Physical Risk dataset models the financial impact associated with changing exposure to acute (e.g., floods, landslides and cyclones) and chronic (e.g., water stress, drought and extreme heat) climate hazards on a company's assets.

Financial impact is expressed as the annual average cost over each future decade, and realized costs will vary from year to year depending on whether and how severely events materialize, as well as the performance of existing or planned adaptation and resilience investments. The modeled financial impacts presented here do not reflect a company's adaptation and resilience efforts and thus represent a "worst case" projection for climate financial impacts that could be offset, at least in part, by investments in adaptation and resilience.

This analysis captures projected physical damages and disruptions associated with acute events such as major tropical cyclones or flooding, which can be readily identified in company filings, as well as the drag on business operations due to chronic hazards such as water stress and extreme heat, which are less readily identified and attributed in company reporting.

CSA data methodology

In this analysis, we review S&P Global Corporate Sustainability Assessment (CSA) data on whether companies have disclosed a climate adaptation plan as defined by the CSA.

The CSA defines a context-specific adaptation plan, in which a company assesses the adaptation and resilience needs of individual assets based on their local conditions, as follows: "A context-specific plan integrates physical and nonphysical measures aimed at reducing — to the extent possible and on a best-efforts basis — all material risks that have been identified through a climate risk assessment." Thus, the typical resilience and risk management investments a company makes may not qualify as climate adaptation planning unless they result from climate risk assessments.

Methodology for high-resolution flood projections

New high-resolution river flood projections from S&P Global Sustainable1 provide analysis of flood exposure zoomed into 30x30 meters and potential damage down to the individual building level.[20] The model, combining S&P Global Sustainable1 climate projections with historical data from flood-modeling firm JBA Risk Management, includes data on flood defense systems such as levees. This shows which buildings depend on flood-protection infrastructure and where protection may be inadequate for anticipated future risks.

Flood depths are modeled for the current climate (the 2020s decade) and projected to the end of the century under four climate scenarios. The model data are probabilistic and cover a range of outcomes — from frequent nuisance flooding of shallow depth (2-year return period) to rare catastrophic flooding (1,000-year return period). JBA also provides information on local and regional flood defense systems such as levees, and these measures are reflected in our projections of flood depths for the four future climate scenarios.

Flood depths that were historically infrequent are projected to become more common in many regions as the world warms. Property owners, investors and banks with mortgage portfolios in developed areas around rivers may seek to reassess their exposure to floods as historical trends may no longer reflect long-term resilience.

In many regions, climate change is projected to drive an increase in the frequency of low-probability, high-impact river floods, turning a 100-year event into a 75-year or 50-year event.

20. S&P Global Sustainable1. April 20, 2026. 'How high-resolution data translates flood risk into financial risk.' https://www.spglobal.com/sustainable1/en/insights/research-reports/how-high-resolution-data-translates-flood-risk-into-financial-risk

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