

Network for Greening the Financial System

NGFS Report

NGFS – 31 Case studies, Note on the economic and financial impacts of extreme weather events (2026)

June 2026



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1. Wildfires in Australia (2019-2020)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Bushfires in eastern and southern Australia.	
Date of occurrence for the event described in this survey	November 2019 to January 2020.	
Geographical scale of occurrence for the event	Regional: around 24 million hectares of land burnt.	Mongabay (2024)
Type of hazard for the event	Bushfires.	
Magnitude and length	Largest bushfire in recorded history.	
Impact on population of the hazard	In total, 33 people had lost their lives, more than 3,000 homes had been destroyed, and more than 17 million hectares of land had been burnt.	Australian Public Service Commission (2020)
Which and how economic agents were primarily affected	Regional households and communities.	
Overview of how the economy in was affected, with a focus on most impacted sectors	Tourism: AUD2.8b and 7,300 jobs Agriculture: AUD4-5b.	The University of Sydney (2024)
Any other key characteristic deemed relevant		
2. ECONOMIC DISRUPTION		
Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	
	Inflation rate (in pp)	
	Unemployment rate (in pp)	
	Total import & export (gross or in %)	
	Others	
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	
	Insured and uninsured losses, in volume and in % of total losses	
	Other relevant variables	

Contagion and international spillover effects
observed following the event

Public measures taken to mitigate the impact of
the disaster or boost the economic recovery

Other comments

3. FINANCIAL DISRUPTION

Impacts on the banking sector

Impacts on the insurance sector

AUD2.4b

[Insurance Council Australia \(2021\)](#)

Impacts on financial markets, at local or
global scale

Impacts on public finances

Other comments

2. Flood in Australia (2022)

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Questions	Responses	Sources	
1. EXTREME WEATHER EVENT			
General description of the event described in this survey	Flooding in the Northern Rivers region of Australia, late February to early March 2022, resulting from exceptional rainfall that impacted several communities.	National Emergency Management Agency (2022)	
Date of occurrence for the event described in this survey	22 February to 15 March 2022.		
Geographical scale of occurrence for the event	Regional.		
Type of hazard for the event	22 February to 15 March 2022.		
Magnitude and length	Highest recorded rainfall, highest recorded flood levels.		
Impact on population of the hazard	4,055 properties were deemed uninhabitable, and a further 10,849 properties were assessed as damaged. 4,000 people evacuated.	Audit office of New South Wales (2024)	
Which and how economic agents were primarily affected	Damage/destruction of homes and businesses by flooding.		
Overview of how the economy in was affected, with a focus on most impacted sectors	Economic activity, tourism, agriculture.	Deloitte (2025)	
Any other key characteristic deemed relevant			
2. ECONOMIC DISRUPTION			
Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	AUD3.7b cost including damage to property and infrastructure, lost economic activity, and social impacts such as injury and loss of life.	Deloitte (2025)
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others		

Quantitative estimates of the natural hazard's impact	<p>Sectoral GVA for impacted sectors</p> <p>Sectoral production for impacted sectors</p> <p>Food price index</p> <p>Insured and uninsured losses, in volume and in % of total losses</p> <p>Other relevant variables</p>	
Contagion and international spillover effects observed following the event	Availability of temporary accommodation. Availability of builders to carry out work.	
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>Primary Industry Support Package – \$150 million – supporting the recovery, rebuilding and resilience efforts for flood-impacted primary producers and industries.</p> <p>Anchor Business Support Program – \$59.3 million – to help large businesses in the Northern Rivers return to operations and continue to support employment in the region.</p> <p>2022 Community Local Infrastructure Recovery Package – \$207 million – to repair, rebuild and improve flood damaged community infrastructure.</p> <p>Riparian Stabilisation Package – \$64 million – to repair and regenerate flood-impacted riparian and estuarine areas.</p>	New South Wales Government
Other comments		
3. FINANCIAL DISRUPTION		
Impacts on the banking sector		
Impacts on the insurance sector	Insured losses AUD4.8b.	Australia Local Government Association (2022)
Impacts on financial markets, at local or global scale		
Impacts on public finances		
Other comments		

3. Flood in Brazil (2024)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	The floods of 2024 were the most devastating natural disaster in the history of Rio Grande do Sul, Brazil. This catastrophe resulted in 184 fatalities, displaced hundreds of thousands of people, and caused economic damages estimated at around BRL 88.9 billion (approximately US\$15 billion). Notably, 78% of the total losses were incurred by the private sector.	Agência Nacional de Águas e Saneamento Básico (ANA) (2025) Suarez et al. (2024)
Date of occurrence for the event described in this survey	April and May 2024 (approximately 25 th April – 15 th May 2024).	ANA (2025)
Geographical scale of occurrence for the event	Of the 497 municipalities in the state of Rio Grande do Sul, 478 were affected.	ANA (2025)
Type of hazard for the event	Flood.	
Magnitude and length	Rainfall totals exceeded 700 mm in the northern part of the state. In some cases (for example, three days of rainfall over an area of 10,000 km ²), the 2024 precipitation was 47% higher than the previous record. The rainfall in 2024 was both heavier and more intense than the precipitation from the region's previous major flooding event in 1941.	ANA (2025)
Impact on population of the hazard	ANA, page 8: Nearly 2.4 million people were affected. More than 15,000 km ² were submerged, resulting in alarming human and social losses: 183 confirmed fatalities and 27 people reported missing, in addition to 806 injured. Exposure to the floodwaters led to more than 15,000 recorded cases of leptospirosis. Residential areas were severely affected, with thousands of homes destroyed or damaged. Approximately 146,000 people were displaced, and more than 50,000 were left homeless. IR, page 32: Rio Grande do Sul has an estimated population of 10.9 million people, 5.3% of the Brazilian population.	ANA (2025) Banco Central do Brasil (2024)
Which and how economic agents were primarily affected	There was destruction of urban and rural infrastructure, interruption of productive activities, and logistic issues. There were significant shocks to industry, commerce, services, and agriculture, as well as impacts on the labor market and prices.	Banco Central do Brasil (2024)
Overview of how the economy in was affected, with a focus on most impacted sectors	The effects of the flooding were observed across all segments of the economy, albeit with significant heterogeneity. Industrial output declined sharply in May but recovered quickly in the following months. The services sector – particularly those provided to households and tourism-related activities – was severely affected and has shown a slower pace of recovery. Some agricultural segments with substantial participation in the state's economy were also impacted. However, the effect was mitigated by the fact that much of the summer crop had already been harvested and the planting of the winter crop had not yet begun. The estimated effects on the agricultural sector include over R\$8.5 billion in production losses, approximately R\$500 million in damage to agricultural assets, and about R\$3.7 billion in additional costs for the recovery of soils that were damaged by water erosion. In the commercial sector, the estimated economic impact amounted to approximately R\$25 billion. This figure encompasses around R\$14.8 billion in physical damage to infrastructure, equipment, and inventory. While the repercussions were experienced statewide, the financial burden was particularly pronounced within the retail sector. Nonetheless, due to a surge in replacement demand, retail sales exhibited a more rapid-than-anticipated initial recovery. An increased need for essential goods facilitated this rebound, which subsequently expanded to include heightened sales of furniture, household appliances, construction materials, and vehicles. In the industrial sector, the estimated economic impact was approximately R\$14 billion, with the food and apparel industries bearing the most significant impact.	Banco Central do Brasil (2024) Suarez et al. (2024)
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	<p>The impact of the floods on the economic performance of Rio Grande do Sul can be assessed, in aggregate terms, through the evolution of the Central Bank's Regional Economic Activity Index (IBCR-RS). This indicator registered a 7.9% contraction in May, followed by a rebound of the same magnitude in June. In cumulative terms for 2024, despite the sharp decline in May, economic activity in Rio Grande do Sul outperformed the average of the other states, with growth of 4.3% compared with 3.5% for the comparison group. However, part of the state's strong economic performance this year resulted from the significant expansion of the agricultural sector. Although some products were negatively affected by the floods, the sector managed to recover from the very unfavorable performance observed in 2022 and 2023. Excluding agricultural activity, the IBCR increased by 2.7% in Rio Grande do Sul, below the 3.8% average for the other states.</p>	Banco Central do Brasil (2024)
	Inflation rate (in pp)	<p>The Broad National Consumer Price Index (IPCA) for the Porto Alegre Metropolitan Region (RMPA) showed differences in price behavior compared with the rest of the country. In May, the region's IPCA was 0.41 percentage points higher than the national consolidated figure. However, in the following month, nearly all of this difference was reversed (0.35 p.p.). Additionally, for the remainder of the year, price changes in the region remained lower than the national aggregate. From May to December, cumulative price increases in the RMPA were 0.6 percentage points lower than in Brazil as a whole.</p>	Banco Central do Brasil (2024)

Quantitative estimates of the natural hazard's impact	Unemployment rate (in pp).	<p>The floods also affected the labor market. Data from the Quarterly Continuous National Household Sample Survey (PNADC), conducted by the Brazilian Institute of Geography and Statistics (IBGE), show that in the second quarter of 2024 – which includes the critical period of the floods – the unemployment rate increased in Rio Grande do Sul and declined in the other states (0.2 p.p. versus -0.5 p.p., seasonally adjusted data). In Rio Grande do Sul, the employed population remained relatively stable, compared with a 0.9% increase in the other states. In the subsequent quarters, however, the unemployment rate resumed its downward trend in Rio Grande do Sul, more sharply than in the rest of the country, in line with the recovery in economic activity. In the last quarter of the year, the unemployment rate in Rio Grande do Sul and in Brazil as a whole was 0.6 p.p. and 1.0 p.p., respectively, below the levels observed in the first quarter. Between the first and fourth quarters of the year, the employed population grew 2.1% in Rio Grande do Sul and 1.9% in the other states, while the labor force expanded by 1.4% and 0.9% in those same regions.</p> <p>Data from the New General Registry of Employed and Unemployed Workers (Novo Caged), which covers only formal employment, also indicates the impact of the floods. The employment stock declined by 0.8% in Rio Grande do Sul in May and June, in contrast with the rest of the country, where it increased by 0.7%. This difference primarily reflected the sharp drop in hirings in the state; dismissals fluctuated over the two-month period but did not differ significantly from the levels observed in previous months. Beginning in July, the number of employed workers resumed a consistent upward trend, albeit at a slower pace than in the rest of the country, as had already been occurring before the floods. The impact of the floods on employment was heterogeneous across sectors, consistent with the patterns observed in the economic activity indicators. In particular, the weaker growth in employment in services provided to households stands out compared with the rest of the country.</p>	Banco Central do Brasil (2024)
	Total import & export (gross or in %)	<p>Floods in Rio Grande do Sul also affected the state's logistics infrastructure. Roads were blocked, the Salgado Filho International Airport in Porto Alegre was closed, and port terminals were operating at below-capacity levels. This was reflected in the reduction of foreign trade. The largest impact was on imports, whose quantum index reached its lowest value since May 2020, in the context of the pandemic. This decline may reflect both the direct impact of the interruption of logistics in the region and a possible reduction in certain types of orders. For exports, in turn, the decline was relatively small, compatible with ordinary changes in this category, indicating a limited impact.</p>	Banco Central do Brasil (2024)
	Others		

Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	IR, page 32: The state's GDP represents 6.5% of the national GDP, with a larger share in agriculture (12.7%) and manufacturing (8.4%).	Banco Central do Brasil (2024)
	Sectoral production for impacted sectors		
	Food price index	The national prices of rice and wheat, crops for which Rio Grande do Sul is a major producer, were affected only in the short term. In the case of rice, the harvest was almost complete when the flooding occurred. For wheat, although a smaller area was planted and sowing was delayed, more favorable weather conditions improved productivity in the state, helping limit the impact on prices.	Banco Central do Brasil (2024)
	Insured and uninsured losses, in volume and in % of total losses	Losses observed in agriculture, considering the payments made by Proagro, were significantly lower than those caused by droughts in the previous years. Until September 2024, Proagro payments due to flood losses added up to BRL450 million. This amount is much lower than the BRL6.4 billion paid in 2022 and the BRL10.5 billion paid in 2023 by Proagro.	Banco Central do Brasil (2024)
Other relevant variables			
Contagion and international spillover effects observed following the event	The latest assessments of the floods indicated that 577 schools were damaged, affecting approximately 225,000 enrolled students. The number of state-run schools used as shelters exceeded 80.		ANA (2025)
	There was extensive destruction of road infrastructure, compromising more than 250 road segments and 140 bridges, isolating communities and hindering access to critical areas.		
	During the event, nearly all of the state's dams – whether for energy generation, water supply, or irrigation – presented a high risk of rupture. The flooding generated an extreme volume of solid waste in urban areas, hindering recovery in affected regions for months. Strategic infrastructure was impacted, and basic services were interrupted. Several regions were left without potable water supply for weeks.		
	Salgado Filho Airport, responsible for most of the region's flights, remained closed for approximately six months. More than 200,000 vehicles were damaged or destroyed. Hospitals had to be evacuated, interrupting the operation of these services for weeks.		

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>Site: The Federal Government announced investments for the state of Rio Grande do Sul (RS) to support the population and subnational governments (the state administration and municipal governments) in the areas affected by the floods that struck the state in May 2024. These amounts refer to both budgetary and non-budgetary resources, according to the Federal Government's portal on Rio Grande do Sul.</p> <p>FSR, pages 57 to 60: After a joint assessment with the market, the Conselho Monetário Nacional (CMN) and the BCB adopted measures that contained the effects of the floods in RS. The initiatives safeguarded the provision of services by the National Financial System (SFN) and avoided unnecessary burdens on citizens and companies. The guidelines for the measures were aimed at preserving financial stability and protecting consumers.</p> <p>Among the adopted measures, there were: (i) Intensification of communication with supervised entities (SE) that have relevant business operations in areas affected by floods; (ii) actions made by the BCB to preserve the proper relationship with clients and users of the SFN affected by the tragedy, such as strengthening service channels, applying exceptional conditions, and monitoring the effective compliance with these conditions, as well as communication and management of associated vulnerabilities; and (iii) temporary regulatory permissions, such as regulatory flexibilization for agriculture, flexibility in loss provisions for credit operations under Federal Programs and deduction of the reserve requirements on savings deposit resources.</p> <p>(More details of these measures can be found in FSR, pages 57 to 60).</p>	<p>Banco Central do Brasil (2024)</p> <p>Government of Brazil (CGU) (n.d.)</p>
Other comments		
3. FINANCIAL DISRUPTION		
Impacts on the banking sector	<p>No systemically relevant changes in the funding, liquidity, or credit risk of the supervised entities (ESs) operating in RS have been noted. However, there was a sharp rise in the flow of loans modifications for borrowers located in Rio Grande do Sul in the second quarter of 2024. These additional loan modifications did not appear to lead to an increase in credit losses by the end of the year.</p>	<p>Banco Central do Brasil (2024)</p> <p>Banco Central do Brasil (2025)</p>
Impacts on the insurance sector	<p>Agricultural Activity Guarantee Program (Proagro) paid about BRL 450 million until September 2024 due flood losses.</p>	<p>Banco Central do Brasil (2024)</p>
Impacts on financial markets, at local or global scale		
Impacts on public finances		
Other comments		

4. Wildfire in Canada (2016)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	The event consisted of an extremely severe wildfire followed by a flash flood in Fort McMurray, a region with a high concentration of Canada's oil sands operations : the Athabasca oil sands produce 3.3 million barrels per day – roughly two thirds of Canada's total output – and contribute about 3% of the national economy, making it a critical driver of Canadian employment, investment, and energy security. As home to part of the world's third largest crude reserves, the region also plays a pivotal role in global oil supply chains, shaping international energy markets through its massive production capacity and infrastructure.	The 10 most expensive years for weather, natural disaster in Canada: insurance bureau Globalnews.ca Fort McMurray blaze among most 'extreme' of wildfires: researcher Folio
Date of occurrence for the event described in this survey	The wildfire lasted between April 30 and July 5, 2016, but was fully extinguished on August 2, 2017. The flash flood occurred on July 30-31, 2016.	Fort McMurray wildfire burning so hot, only weather can stop it CBC News
Geographical scale of occurrence for the event	Local/Regional. The impact was concentrated in Fort McMurray, in the Regional Municipality of Wood Buffalo, Alberta.	Fort McMurray and the Fires of Climate Change Open Case Studies
Type of hazard for the event	Wildfire followed by flash flood.	CEC Flood Costing Project Case Study: 2016 Fort McMurray Wildfire & Flood
Magnitude and length	The wildfire exploded in a few days into a crown fire, an extreme, fast-moving blaze that could not be controlled without rain. By the end of May, the fire had burned approximately 590,000 hectares, an area comparable to more than three times the size of Greater London. Flash flood led to 85 mm of rainfall on July 31 resulting in significant power outages, road closures and building damages.	Canadian Disaster Database How Fort McMurray Oil Sands Shape Global Supply Chains
Impact on population of the hazard	90,000 people were evacuated. This accounts for more than 100% of the population of Fort McMurray at the time (~72,000) since the affected population included thousands of temporary oil-sands workers living in camps north of the city. No direct deaths due to the fire itself.	
Which and how economic agents were primarily affected	Households: population displacement led to lost income. About 8% of private dwellings (~2400 homes) in the area were destroyed, resulting in uninsured losses, lower disposable income, and a major loss of wealth/assets for individual households. Companies: Firms in the Oil sands industry, refineries, local businesses in construction, retail and wholesale trade etc. were also massively impacted due to lost hours of work. The wildfire spread into the Athabasca oil sands areas, forcing shutdowns, evacuations of workers and reduced output, directly impacting the firms' profitability. Statistics Canada reported that gross operating surplus (corporate profits before interest and taxes) of non-financial corporations declined by 0.3% in Q2 2016 but grew by 4% in the following quarter. The increase was primarily in the oil and gas extraction, and petroleum and coal product manufacturing industries, in tandem with higher energy exports once oil production returned to normal after the wildfire. Financial companies, especially P&C insurers, were impacted due to huge payouts in insurance claims. Farmers: Faced massive crop loss and long-term orchard damage.	The Daily – Gross domestic product, income and expenditure, second quarter 2016 The Daily – Gross domestic product, income and expenditure, third quarter 2016 Fort McMurray Fire Caused Loss of 7 million Man Hours: Statistics Canada – Oil & Gas 360

Overview of how the economy was affected, with a focus on most impacted sectors	<p>Fort McMurray is home to Canada's major oil-sands facilities (such as Suncor, Syncrude etc.). Thus, oil sands extraction took the largest hit to value-added, and as the primary channel through which wildfire impacts propagated to provincial and national aggregates (GDP, exports etc.). Operational shutdowns and evacuations at oil sands facilities cut output by up to ~1M barrels per day while also resulting in 2,668,100 lost work hours (May-June).</p> <p>With worksites inaccessible or damaged, construction industry logged ~1,339,600 of lost work hours during the same time. However, rebuilding efforts as indicated by the increase in the number of building permits issued could have mitigated this impact in the subsequent months (June-December 2016).</p> <p>Wholesale and retail trade lost ~769,000 work hours as stores closed, and businesses and economic activity in the area were brought to a halt.</p> <p>Hospitality industry in the area lost 640,600 work hours owing to evacuation, damage, and service suspensions.</p> <p>Even as emergency relief measures spiked, Healthcare and Social Assistance still lost 640,300 work hours reflecting staff displacement and facility constraints.</p>	Infographic: Fort McMurray 2016 Wildfire – Economic Impact
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Any other key characteristic deemed relevant

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	<p>Canada's real GDP fell by 0.4% (~CAD7 billion) quarter over quarter (QoQ) in Q2 2016 (1.6% annualized decline), making it the largest quarterly decline since Q2 2009. The contraction was driven by a 4.5% drop in exports, especially a sharp drop in energy product exports resulting from oilsands shutdowns and evacuations during the wildfires. Increased government spending on wildfire related reconstruction and relief measures etc. partly helped offset this shock (government final consumption expenditure rose by 1%). According to Statistics Canada's estimates at the time, excluding the steep fall in crude output, real GDP would have risen by 0.1% QoQ in Q2 2016, underscoring the wildfire's central role. The quarter ended with a rebound in June as real GDP grew by 0.6% compared to May as oilsands production resumed. GDP bounced back in Q3 2016, growing by 1%, driven by the growth in the energy sector after the wildfire impacts subsided.</p>	<p>The Daily – Gross domestic product, income and expenditure, second quarter 2016</p> <p>Fort McMurray wildfire takes toll on Canadian economy; GDP posts worst showing since 2009 Globalnews.ca</p> <p>The Daily – Gross domestic product, income and expenditure, third quarter 2016</p>
	Inflation rate (in pp)		

Quantitative estimates of the natural hazard's impact	Unemployment rate (in pp)	<p>The wildfires did not result in a material impact on Canada wide Unemployment rate. However, it significantly worsened Alberta's labour market at a time when the province was already in recession due to collapsing oil prices. While the official Q2 2016 unemployment numbers underreported the true extent of joblessness because entire communities were inaccessible to surveyors, employment insurance claims and lost work hours data show the real impact was far more severe.</p> <p>Alberta entered 2016 in a deep recession triggered by the collapse in global oil prices (2014–2016). This caused mass layoffs throughout the energy sector. In April 2016, Alberta's unemployment rate rose to 7.2%, the highest level since the 1990s, as the province lost more jobs than the rest of Canada combined, even before the wildfire occurred. In May, as the wildfire forced oil sand production shutdowns in Fort McMurray, Alberta's unemployment rate increased by .6 percentage points from 7.2% to 7.8%. 24,000 net job losses were reported in Alberta in the month of May, with about half of the losses emanating from the natural resources sector and another 7,400 from Construction. Alberta also recorded a 5.1% decline in total hours worked in May, the provinces largest drop in 30 years. However, according to the source cited, the actual situation was much worse as Statistics Canada was unable to survey households in the Wood Buffalo area due to wildfire evacuation.</p> <p>Employment insurance claims and lost work hours data from Statistics Canada suggested a grimmer picture revealing the hidden unemployment spike. In Alberta, 77,800 people received EI benefits in May, up 8,400 or 12.1% from April, the largest advance since June 2009. Gains occurred throughout the province, including Edmonton (+ 8.4%) and Calgary (+ 6.8%). However, nearly one-third of the provincial rise in the number of beneficiaries occurred in the census agglomeration (CA) of Wood Buffalo, which includes Fort McMurray. The number of beneficiaries in Wood Buffalo more than doubled (+ 141.6%) from 1,900 in April to 4,500 in May. This increase coincided with the wildfire in northern Alberta, which resulted in the evacuation of residents from the Fort McMurray area in early May. On a year-over-year basis, the number of beneficiaries in Alberta was up by 58.6%.</p> <p>According to another Statistics Canada's special wildfire impact report, 8.5 million work hours were lost in Fort McMurray in May-June 2016, 80.4% of all employed people in the region lost working time. Alberta outside Fort McMurray lost an additional 2.9 million hours in the same period.</p> <p>The employment insurance and lost work hours data thus suggested massive labour market disruption, far greater than what was being reflected by the unemployment rate at the time, suggesting that actual damage was understated.</p>	<p>Alberta unemployment rate ticks up to 7.2% in April as jobs stagnate nationwide CBC News Alberta unemployment rate ticks up to 7.2% in April as jobs stagnate nationwide CBC News</p> <p>Alberta unemployment rate surges to 7.8% with largest decline in hours worked in 30 years CBC News</p> <p>The Daily – Employment Insurance, May 2016</p> <p>The Daily – Wildfires in northern Alberta: Impact on hours worked, May and June, 2016</p>
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Quantitative estimates of the natural hazard's impact	Total import & export (gross or in %)	<p>The wildfire struck in early May 2016, forcing shutdown of oilsands operations, disrupting supply chains, forcing mass evacuation, and reducing energy exports. These disruptions were clearly reflected in Canada's national trade data.</p> <p>Canada's total exports of goods declined significantly in Q2 2016 QoQ by 5.5%, following a 1.9% increase in Q1. Energy products were a major contributor – exports of crude oil and bitumen fell by 9.6%, while refined petroleum energy products plunged 19.6%, pushing total energy product exports down by 7.5% in the quarter. The sharp drop in exports caused the total exports of goods and services to decline by 4.7% in the quarter (note exports of services increased by 0.6% in Q2 2016, making it the steepest quarterly decline since Q1 2009. However, Q3 2016 saw a recovery with total exports growing by 2.3%. Energy products were at the centre of this rebound, with energy exports increasing by 6.1% in Q3, following a 5.1% decline in Q2 due to maintenance shutdowns brought on by the wildfires.</p> <p>Total imports (goods and services) grew by 0.3% in Q2 2016, following a 0.4% increase in Q1, driven by an increase in imports of goods as services imports were unchanged.</p> <p>Note while Statistics Canada attributes the slowdown and recovery in exports to the wildfires as one of the key factors, it does not isolate the wildfire's specific contribution within the trade statistics. However, the timing of the collapse, especially the sharp declines in energy product exports aligns with production shutdowns and disruptions caused by the May wildfires, which temporarily halted significant oil sands output and affected associated supply chains. Other sectors beyond energy, such as metals, minerals, and consumer goods also contributed to the decline, but the wildfire overlap with Q2 2016 likely amplified the pressures on exports of goods.</p>	<p>The Daily – Gross domestic product, income and expenditure, first quarter 2016</p> <p>The Daily – Gross domestic product, income and expenditure, second quarter 2016</p> <p>The Daily – Gross domestic product, income and expenditure, third quarter 2016</p> <p>Gross domestic product, exports and imports</p> <p>https://www150.statcan.gc.ca/n1/daily-quotidien/161104/dq161104b-eng.htm</p> <p>The Daily – Canadian international merchandise trade, June 2016</p> <p>Infographic: Fort McMurray 2016 Wildfire – Economic Impact</p>
Others			
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	<p>Based on the national level Real GDP data from Statistics Canada, the worst impacted sectors were the Energy sector and Mining, quarrying, and oil and gas extraction sector.</p> <p>The energy sector saw the worst decline since Q2 2009, with gross value added (GVA) falling by 4.4% in Q2 2016 compared to Q2 2015 (YoY change); this was worse than the 4% decline it experienced during the Global Financial Crisis (GFC) in Q2 2009. GVA recovered in Q3 2016 expanding by 8.3% (YoY change) as the impact of wildfires subsided.</p> <p>Mining, quarrying, and oil and gas extraction also saw its worst decline since Q2 2009, with GVA falling by 7% in Q2 2016; this was almost as severe as the 7.8% decline during the GFC in Q2 2009. GVA recovered in Q3 2016, expanding by 10% (YoY change). Statistics also indicate that real GDP in the non-conventional oil extraction industry declined by 20% in May.</p> <p>Construction, transportation, and retail trade and wholesale trade were also potentially impacted with GVA contracting by 2%, 1%, and 1% respectively. GVA of these sectors recovered in Q3 2016.</p> <p>Alberta's forestry sector also suffered reports indicating extensive destruction of feed acreage.</p>	<p>Historical (real-time) releases of gross domestic product (GDP) at basic prices, by industry, monthly</p> <p>Infographic: Fort McMurray 2016 Wildfire – Economic Impact</p> <p>Fort McMurray fire burned a \$500M hole in Alberta's finances: Joe Ceci Edmonton Journal</p>

Quantitative estimates of the natural hazard's impact	Sectoral production for impacted sectors	<p>The key sector that was impacted was oil sands production as Fort McMurray is home to Canada's major oil sands facilities. According to Statistics Canada, at its peak, Fort McMurray wildfires were estimated to have cut 1-1.5 MMb/d worth of oil sands production. This represented nearly 40 to 60% of Canada's total oil sands production (~2.4 MMb/d) and 25-40% of the total Canadian crude oil production at the time (~3.9 MMb/d). The wildfire thus led to the lowest level of crude oil production in Canada since June 2011.</p> <p>Refinery production was also impacted, decreasing by 7.2% (to 8.2 million cubic meters) in May 2016, compared to May 2015. The decline could be due to reduced availability of crude oil feedstock as refinery receipts of domestic crude fell 31.8 to 3.2 million cubic meters in May 2016 compared to May 2015, dropping to the lowest level since April 1973. Canada's two largest refining provinces at the time, Alberta (-40.7%) and Ontario (-36.9%), reported most notable declines in receipt of domestic crude.</p> <p>Reduced crude output also impacted the freight volumes transported within and Canada and to the United States. According to Stat Canada's rail industry data, total freight volumes of goods transported from Alberta/Northwest Territories saw a modest of 1.5% decline in 2016. However, freight volumes to the United States and Mexico fell more sharply, down 3.8% year over year (YoY). Fuel oils and crude petroleum were key contributors, with volumes to those markets dropping 17% YoY.</p> <p>Statistics Canada's Monthly survey of manufacturing for May-June 2016 reported impacts on industry specific trends – 14 firms in the fabricated metals products industry and 12 firms in the machinery industry reported lower manufacturing sales in July. However, 3 firms in machinery, transport and equipment, and miscellaneous manufacturing industries reported higher sales in July reported higher sales in July as a result of demand originating from Fort McMurray. The number of affected firms in British Columbia, Manitoba, Quebec, Saskatchewan and the Atlantic provinces was relatively small.</p>	<p>CER – Market Snapshot: Understanding the Production, Transport, and Refining of Crude Oil in Canada</p> <p>The Daily – Supply and disposition of refined petroleum products, May 2016</p> <p>Canada's wildfire crisis: Economic & trade disruption EDC</p> <p>The Daily – Monthly Survey of Manufacturing, July 2016</p>
Food price index	Insured and uninsured losses, in volume and in % of total losses	<p>A 2019 Swiss RE study points to the following loss estimates:</p> <p>Total direct damage of CA \$5.3 billion, of which 70% or CA \$3.6 billion was insured, and CA \$1.7 billion was uninsured. Total financial impact was estimated at CA \$8.9 billion. This includes direct and indirect damage.</p> <p>A more recent estimate, adjusted for inflation in 2022, estimated total insurance payouts at CA \$5.96 billion.</p> <p>A study from Simon Fraser University (2021) separates out the damages from wildfire and flood that followed. It pegs the total damage (in 2020 US dollars) at US\$6.47 billion, of which US\$ 6.45 billion was due to wildfire and US\$12.7 millions of damage was from the flood that followed. The costs include direct damages to households and commercial buildings and indirect damages such as forgone revenues of energy and utility companies, etc.</p>	<p>Fort-McMurray-Wildfires_Canadian-Copright.FINAL-2_One-Page.pdf</p> <p>Financial impact of Fort McMurray wildfire reaches almost \$8.9B: study</p> <p>The 10 most expensive years for weather, natural disaster in Canada: insurance bureau Globalnews.ca</p> <p>CEC Flood Costing Project Case Study: 2016 Fort McMurray Wildfire & Flood, March 2021</p>
Other relevant variables			

Contagion and international spillover effects observed following the event	<p>The wildfire triggered a temporary but globally significant shock to the international oil markets through record disruption of global energy supply. Since Canada is the world's fourth largest oil producer and US's largest foreign supplier, the sudden loss of oilsands output created ripple effects across global crude markets and supply chains with potential subsequent impacts on transportation costs and refined product markets.</p> <p>According to Canadian Energy Regulator, the wildfires forced a shutdown of 1-1.5 MMB/d of oil sands production representing roughly 40%-60% of total oil sands output and 25%-40% of total crude production in Canada. This led to massive, unplanned disruptions in global oil supply to the tune of more than 3.6 MMB/d in May 2016, eliminating the previous global oil glut. In parallel, there were outages in Nigeria, Venezuela and Iraq. Together with the Fort McMurray fire, they pushed the global oil market from oversupply to a more balanced state. As a result, Brent crude prices soared above \$50p/b for the first time in 2016, a huge rebound from a 13 year low of \$28 just months earlier. However, there was no long-term loss of production since no existing oil sands facilities were significantly damaged. Canadian oil output gradually rebounded through June. As production fully recovered by August, this limited longer term effects on oil prices internationally.</p> <p>According to the U.S. EIA since oil sands operations consume significant volumes of natural gas, the wildfire-driven production shutdowns directly reduced natural gas demand, resulting in a 25% fall in natural gas prices in Alberta.</p> <p>The fire also impacted Canadian crude oil imports into the US. The U.S. is the major destination of Canadian crude. According to CER, in 2015, Canadian exports hit a record 3.05 MMB/d, most shipped to the U.S. Midwest. Nearly 60% (2.38 MMB/d) of this output came from oil sands near Fort McMurray.</p> <p>EIA reported that local pipeline capacity was also a shutdown in response to the fire, reducing crude oil takeaway capacity. As a result, US imports of Canadian crude declined notably during the wildfire but fell less than the total Canadian production outages, because storage volumes cushioned impacts.</p> <p>Analysts warned of gas price increases in US Midwest, since those refineries are exclusively engineered to run on heavy Canadian crude from Alberta (Western Canadian Select) and thus risked losing access to their primary, low cost feedstock.</p>	<p>Trade Ready, June, 2016</p> <p>U.S. Energy Information Administration (EIA), June 2016</p> <p>Canada Energy Regulator, January 10, 2017</p> <p>Canada Energy Regulator, April 29, 2016</p> <p>Canada Energy Regulator, April 22, 2016</p> <p>TIME, May 5, 2016</p> <p>National Geographic, May 11, 2016</p>
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>Province of Alberta provided over \$7M in tax relief for affected families, including compensation for education and property taxes in 2016 and 2017.</p> <p>The Red Cross supported by government funding, provided over \$2.9M in direct aid to roughly 3,300 small businesses to cover uninsured losses, equipment rentals and cleanup costs.</p> <p>The Federal government provided an advance payment of \$300M to Alberta to help share recovery effort costs.</p>	
Other comments		

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>The wildfire resulted in a significant but localized surge in mortgage delinquencies within a year. It did not lead to any systemic impacts on the Canadian banking sector. The impacts were temporary and largely faded within 12-18 months. The following observations are based on an empirical study from Bank of Canada conducted in 2023.</p> <p>The impact was primarily concentrated in severely damaged areas, while areas with limited damage showed no significant spike in arrears. In hard hit areas, mortgage arrears nearly doubled 0.59% in the month before the wildfire to over 0.90% by October 2016. In less damaged areas, the increase in arrears was small and statistically insignificant. Further, the shock was temporary – arrears normalized within 12-18 months in hard hit areas, and within about three months in less damaged areas.</p> <p>Targeted relief measures offered by the banks such as payment deferrals, fee relief and flexible credit arrangements to borrowers, alongside wider public and employer support programs were key factors that helped contain the persistence of arrears and protect broader financial stability. Further, fast rebound in oil sands production (by August 2016) limited income deterioration for borrowers, further limiting the duration of household financial distress.</p> <p>Note the paper controls for confounding effects such as oil price changes since Fort McMurray's population is heavily employed in oil sector. Therefore, it attributes the delinquency impacts almost entirely to the wildfire. (164)</p>	Bank of Canada, 2023
Impacts on the insurance sector	<p>The wildfire led to total insured loss of CA \$5.6 billion making it the costliest natural disaster in Canada till date. According to data from Statistics Canada, the gross operating surplus (corporate profits before interest payments and taxes) of financial corporations fell significantly by 28.5% in Q2 2016, almost entirely driven by the massive insurance payouts due to the wildfire in Fort McMurray. It rebounded strongly (+46.6%) in Q3 2016.</p> <p>Some reports indicate how the wildfire destabilized the local insurance market in the Regional Municipality of Wood Buffalo in Alberta. In the years that followed, residents faced a combination of insurer withdrawals, soaring premiums while coverage was reduced, unresolved claims and financial hardships, including bankruptcies. Multiple condominium boards struggled to get adequate insurance coverage, with insurers refusing to renew policies, leaving buildings nearly uninsurable. Insurance premiums skyrocketed, pushing some homeowners to the brink of bankruptcy. For example, one of the condominium corporations saw their insurance premium increase by 650% in 2019, following claims related to the Fort McMurray wildfire in 2016, while the policy only covered one sixth of the appraised value. Another corporation reported an increase 800% in premiums with only one third coverage. About 190 residential insurance claims remained unresolved even after three years of the fire, leaving households in financial limbo. Many displaced residents were paying mortgages on destroyed homes and were renting houses elsewhere even as insurers cut off their living expense allowances prematurely.</p> <p>A recent report (2025) indicates that home insurance costs in wildfire prone areas in Canada are rising sharply, with premiums in some cities now accounting for nearly one fifth of mortgage payments. Wood Buffalo recorded a 37% rise to CA \$3,367, accounting for 16% of mortgage costs. The report also highlighted that one of the insurers, Aviva Canada withdrew from Alberta's home and Auto insurance market in 2025, citing regulatory and climate pressures. A report from TD Economics indicates that premiums are increasing faster than housing values in wildfire zones, raising affordability concerns, with wildfire prone regions facing sharper premium increases than other areas. Home insurance premiums have risen consistently, with significant pressure on Alberta and British Columbia, two provinces with high wildfire exposure.</p> <p>The devastation to Fort McMurray's insurance landscape was further compounded by the flooding that followed. Much of Fort McMurray is built in a floodplain and while a flood of this measure was not recorded in 100 years, the region had seen 15 notable floods since the 1830's. Situated at the confluence of two rivers (Clearwater and Athabasca), the city is naturally prone to icejam and overland flooding events that have repeatedly inundated lowlying districts. The consequences on insurance were severe - most residents lacked flood insurance or were significantly underinsured, because overland flood coverage is not included in standard policies and is typically unavailable to homeowners located in designated floodhazard areas. The event underscored systemic gaps in coverage availability, with insurers broadly unwilling to underwrite highrisk floodzone properties, further destabilizing the region's already fragile insurance market.</p>	Fort McMurray Today, May 28, 2025 Risk Management Magazine, September 1st, 2016 Insurance Business, Sep 24, 2025 Many Uninsured in Fort McMurray Flooding Normac Storeys, January 30, 2025 StatCan, May 15, 2024 The Globe and Mail, June 16, 2019

Impacts on financial markets, at local or global scale	<p>The wildfire did not result in any meaningful systemic stock market devaluation or fire sales in the Canadian or international markets.</p> <p>However, the average sale price of homes in Fort McMurray dropped as much as 19% in some cases, following the Fort McMurray wildfire – the largest insured catastrophe in Canadian history.</p>	<p><u>Deloitte, An international comparative study of catastrophic risk mitigation and insurance, March 2021</u></p>
Impacts on public finances	<p>Suspended oil production, amounting to about CA \$40 million over the two months of the fire resulted in lost royalties, corporate and personal income tax worth CA \$300 million while the wildfire itself cost the province of Alberta CA \$500 million in relief and recovery spending measures. The wildfires were reported to have increased the provincial government's trade deficit by about CA \$527 million.</p>	<p><u>Edmonton Journal, Aug 23, 2016</u></p>
Other comments		

5. Drought in Ecuador (2024)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

Disclaimer: The NGFS strives to disseminate accurate and up-to-date information and will correct any errors brought to its attention where possible. However, it cannot be held liable in any way for the use or interpretation of the information contained in this publication.

Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	During the second semester of 2024, Ecuador experienced its most significant drought in sixty years, which substantially impacted hydroelectric energy production. Combined with rising energy demand due to population growth and industrial expansion, these factors led to power shortages lasting up to nearly fourteen hours on the most critical days.	Banco Central del Ecuador (2013)
Date of occurrence for the event described in this survey	Second semester 2024.	
Geographical scale of occurrence for the event	National.	
Type of hazard for the event	Drought.	
Magnitude and length	The flows in the country's main hydroelectric power stations reached historically low levels, operating at only 21% of their total capacity. This was caused by the severity of the drought during those months of the year. According to data from the UC Santa Barbara Climate Hazards Center, Ecuador's average precipitation in 2024 was 25.0% lower compared to 2023 and represented one of the lowest levels recorded in the past five years.	Banco Central del Ecuador (2013) Monica Orcozo (2024) Data
Impact on population of the hazard	No records exist documenting the effects of the hazard on the population.	
Which and how economic agents were primarily affected	Considering only the firms that were surveyed, which correspond to the largest companies, losses in nominal terms amounted to USD 1,916 million. In addition, it was estimated that the projected economic growth for 2024 decreased by 1.4 percentage points due to the impact of electricity rationing.	Banco Central del Ecuador (2013)
Overview of how the economy in was affected, with a focus on most impacted sectors	The economic sectors that recorded the greatest impacts were Trade (USD 763 million), Manufacturing (USD 380 million), Services (USD 474 million), Primary Sector (USD 320 million), and Construction (USD 79 million).	Banco Central del Ecuador (2013)
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	It was estimated that the projected economic growth for 2024 decreased by 1.4 percentage points due to the impact of electricity rationing.	Banco Central del Ecuador (2013)
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	The impact of the drought in real terms is aggregated.	
	Sectoral production for impacted sectors	The economic sectors that recorded the greatest impacts were Trade (USD 763 million), Manufacturing (USD 380 million), Services (USD 474 million), Primary Sector (USD 320 million), and Construction (USD 79 million).	Banco Central del Ecuador (2013)
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses		
	Other relevant variables	Increased electricity imports, especially for the months of August, September, November and December 2024, due to the severe hydrological conditions the country experienced. Increased imports of diesel and production of petroleum derivatives (Fuel Oil #4 and Fuel Oil #6) in the second half of 2024, especially for use in electric generators.	CENACE (2024) Banco Central del Ecuador
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	Executive Decree 384 established that, during the months of December 2024, January and February 2025, residential users of the public electricity service throughout the country will receive compensation equivalent to 180 kW/h in their monthly bill.	Government of Ecuador (2022)	
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector

Impacts on the insurance sector

Impacts on financial markets, at local or global scale

Impacts on public finances

The amount allocated to the energy sector in the General State Budget (PGE) increased from USD 103 million to USD 473 million in September 2024. These resources are primarily allocated to contract emergency electricity generation.

Ministerio de Economía y Finanzas de Ecuador, n.d.

Sebastián Angulo (2024)

Other comments

6. Tropical Cyclone in Eswatini (2021)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Tropical Cyclone Eloise formed over the SouthWest Indian Ocean on 14 January 2021 and made landfall in Mozambique on 23 January before moving west-southwest towards Eswatini. As the system passed, it brought intense rainfall of approximately 90-385 mm within 24 hours along its path, accompanied by wind speeds of up to 110 km/h. Eswatini began receiving persistent rainfall on the night of 23 January, initially affecting northern Hhohho before spreading across the country through Sunday and into Monday. The prolonged heavy rains led to rapidly filling dams, river flooding, waterlogged soils, and widespread structural damage- destruction of roads, bridges and buildings. There were six (6) fatalities, 105 displaced persons and approximately 1,500 people affected.	National Disaster Management Agency (2021) Swaziland news Relief Web, UN Office for the Coordination of Humanitarian Affairs (2021)
Date of occurrence for the event described in this survey	Tropical Cyclone Eloise caused persistent rains, between 23 to 25 January 2021.	Ministry of economic planning and development (2022)
Geographical scale of occurrence for the event	This was a nation level event that impacted the entire Kingdom of Eswatini. It impacted all of the four regions (Hhohho, Manzini, Shiselweni and Lubombo). Within each region are reported cases of damage to households and access disruptions, impacting urban and rural, road networks, river systems and public facilities across the country.	Ministry of economic planning and development (2022)
Type of hazard for the event	It is described as a tropical cyclone accompanied by heavy rains, which induced landslides. (Landslide, Storm, Flood).	Government of Eswatini (2021) International charter space & major disasters
Magnitude and length	As the system passed, it brought intense rainfall of approximately 90-385 mm within 24 hours along its path, accompanied by wind speeds of up to 110 km/h. The Rapid Assessment Report noted that Tropical Cyclone Eloise resulted in an estimated economic loss of about SZL 182 million, a result of extensive flooding that led to widespread damage to built infrastructure and utility networks, loss of lives and livelihoods, and environmental degradation (National Disaster Management Agency, 2021). In addition, the drainage systems of many cities, such as Mbabane, are increasingly failing to cope with heavy rainfall and flood episodes. New articles report of flooding to the Mall in the capital city, damaging vehicles and existing infrastructure.	

Impact on population of the hazard	<p>The Rapid Assessment Report noted that Tropical Cyclone Eloise resulted in an estimated economic loss of about SZL 182 million, a result of extensive flooding that led to widespread damage to built infrastructure and utility networks, loss of lives and livelihoods, and environmental degradation (National Disaster Management Agency, 2021).</p> <p>In addition, the drainage systems of many cities, such as Mbabane, are increasingly failing to cope with heavy rainfall and flood episodes. New articles report of flooding to the Mall in the capital city, damaging vehicles and existing infrastructure.</p> <p>There were six (6) fatalities, and in Big Bend (Lubhombo Region), 105 displaced.</p>	<p>The Citizen (2021) Government of Eswatini (2021) News24 (2021)</p>
Which and how economic agents were primarily affected	<p>Both households, companies and financial companies were affected by cyclone Eloise.</p>	<p>UN Office for the Coordination of Humanitarian Affairs (2021)</p>
Overview of how the economy in was affected, with a focus on most impacted sectors	<p>Urban centers such as Mbabane are increasingly overwhelmed by heavy rainfall because drainage systems cannot cope.</p> <p>Total economic losses from TC Eloise were estimated at E226.3 million (NDMA, 2021). Public infrastructure damage accounted for E153.2 million – just over two thirds of total losses.</p> <p>Losses to productive sectors totalled E73.1 million, driven by disrupted market access, asset destruction, and inventory losses.</p> <p>Output losses across key productive sectors – agriculture & forestry, manufacturing, and transport services – were estimated at E84.1 million, with agriculture & forestry responsible for about 60% of this production shortfall.</p> <p>Private sector infrastructure damage (excluding households) amounted to E38.9 million, resulting in combined private sector losses of E122.0 million.</p> <p>The cyclone had its strongest economic impacts on:</p> <ul style="list-style-type: none"> Agriculture & Forestry. Transport Services. Information & Communication Technology (ICT). Tourism. 	<p>Government of Eswatini (2021) United Nations (2022) Ministry of economic planning and development (2022) Government of Eswatini (2021)</p>

(Hydro) Power Generation (positively affected due to full dams).

Agriculture & Forestry Sector:

a) Damage to Infrastructure and Assets – Losses included damage to irrigation infrastructure, livestock, and forestry equipment.

b) Production Losses – Approx. 345 hectares of productive land were affected:

45 ha sugarcane → E2.8 million in output loss.

Sugar processing loss → E2.5 million due to reduced sucrose supply.

300 ha fruits & vegetables → E40.2 million loss (based on NAMBOARD pricing).

Forestry subsector lost an estimated E7.4 million due to disrupted production hours.

c) Downstream and Spillover Effects.

Because transport services depend heavily on moving agricultural and forestry output, the sector's interruption triggered an estimated: E3.1 million loss in the transport subsector.

Tourism Sector: The cyclone caused destruction of physical tourism assets, affecting: Lodges, tourist facilities, access routes, and outdoor tourism activities.

This resulted in operational disruptions and reduced revenue for tourism operators.

NDMA recorded E28.1 million in production losses in the ICT sector. These losses reflect: Service disruptions, Damaged equipment or installations, and reduced operational capacity during the cyclone period.

Transport – Losses in this sector were largely indirect, driven by: reduced agricultural and forestry output, damaged access roads, transport-dependent value chains being interrupted. Estimated loss: E3.1 million, linked to diminished haulage demand.

However, the cyclone increased dam and reservoir water levels to 100% capacity, improving hydropower generation potential, and water security for downstream users.

Any other key characteristic deemed relevant

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	According to the assessment done by NDMA (2021), total losses emanating from TC Eloise were estimated at E226.3 million. Of the total losses, the NDMA estimated that more than two-thirds (E153.2 million) were accounted for by damages in public infrastructure while the balance related to losses to productive sectors in terms of market access, asset, and inventory losses.	Ministry of economic planning and development (2022)
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)	<p>Eswatini's export sector is heavily reliant on agriculture and manufacturing (specifically sugar, wood pulp, and textiles).</p> <p>Crop Destruction: Massive flooding affected agricultural production. Since a significant portion of Eswatini's merchandise exports are agro-based, the waterlogged farmlands led to a decrease in the volume of goods available for the 2021/22 export cycle.</p> <p>Supply Chain Delays: Flooded rivers and damaged bridges made it difficult for textile and sugar producers to transport finished goods to the Durban or Maputo ports.</p> <p>Total Exports 2021 (Post-Cyclone): +18.0%.</p> <p>Total Imports 2021 (Post-Cyclone): +32.3%.</p> <p>The impact on imports was twofold: a physical restriction of entry and a shift in import demand.</p> <p>Food Security Imports: Because Eloise destroyed over 1,000 hectares of local crops and affected over 2,700 people, Eswatini saw a temporary surge in the need for emergency food imports and humanitarian aid (Non-Food Items).</p> <p>Import Costs: Road damage led to increased transport costs, as trucks had to take longer, alternative routes to enter the country from South Africa or Mozambique, indirectly raising the price of imported consumer goods.</p>	<p>World integrated Trade Solution ReliefWeb, UN Office for the Coordination of Humanitarian Affairs (2021)</p> <p>Ministry of economic planning and development (2022)</p> <p>RES corporation (2022)</p>
	Others	<p>Total Exports 2021 (Post-Cyclone): +18.0%.</p> <p>Total Imports 2021 (Post-Cyclone): +32.3%.</p> <p>Trade Balance: -137%.</p>	

Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	<p>Quantifiable losses were mainly observed in the 'agriculture & forestry' as well as 'information & communication' subsectors.</p> <p>Productive sectors that are deemed to have been directly or indirectly affected by TC Eloise include: 'agriculture & forestry', 'manufacturing', and 'transport services'. The estimated losses (excluding damages to productive infrastructure) in relation to potential output achievable were estimated at E84.1 million, with 'agriculture & forestry' accounting for 60 percent of the overall production output loss. Private infrastructure damages (excluding households) across different sectors, as reported by NDMA was recorded at E38.9 million. Henceforth, the combined losses for private sector amounted to E122.0 million.</p> <p>Specifically, on agriculture, approximately 345 hectares of productive land was affected by TC Eloise, of which 45 hectares was on sugarcane and 300 hectares was on other crops, mainly fruits and vegetables. On basis of sucrose price levels, the sugarcane output is valued at E2.8 million. This further culminates into a E2.5 million loss in sugar processing. Using the National Agricultural Marketing Board (NAMBOARD) price data on different fruits and vegetables, the value of output loss on the 300 hectares was estimated at E40.2 million. The forestry subsector, on the other hand is estimated to have lost E7.4 million in terms of production output losses achievable in the absence of the TC Eloise shock. These reflect losses in production hours. The losses in the 'agriculture & forestry' subsector also triggered potential losses in the transport services. Given the reliance of haulage transport on 'agriculture & forestry', it is estimated that the transport subsector lost approximately E3.1 million in 2021. In addition, losses amounting to E28.1 million reported by the NDMA as production losses in the ICT subsector were assumed, for the purposes of this analysis (in the absence of any other information on this subsector).</p>	Ministry of economic planning and development (2022)
	Food price index	<p>While specific food price index data immediately following the event is limited, the destruction of maize fields and vegetable gardens in a country already experiencing drought conditions would have contributed to upward pressure on food prices.</p> <p>Eswatini has high dependence on food imports, valued at over USD 100 million annually, making domestic production losses particularly significant for food security.</p>	Ministry of economic planning and development (2022)
	Insured and uninsured losses, in volume and in % of total losses	<p>Detailed insurance data for this specific event is limited. However, context suggests significant insurance gaps:</p> <ul style="list-style-type: none"> – Most affected households in rural areas have limited access to insurance products. – Agricultural insurance penetration in Eswatini remains low. 	GlobalData (2025)
	Other relevant variables		
Contagion and international spillover effects observed following the event			

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>Evacuation of affected households, including 105 people relocated from Game 5 (Big Bend) to temporary shelters.</p> <p>Airlift rescue operations, including the evacuation of three civilians trapped near the Great Usuthu River.</p> <p>Immediate Humanitarian Relief - Distribution of food parcels (rice, beans, oil) and household essentials, including blankets, tarpaulins, tents, hygiene items, diapers, and cooking essentials.</p> <p>Establishment of temporary shelters coordinated by NDMA and local authorities.</p> <p>Government (via NDMA and the Ministry of Public Works) initiated urgent rehabilitation of roads and bridges, including allocation of E300,000 to restore the Makhwahla Bridge in Maphalaleni – the only link between several rural communities and essential services.</p> <p>NDMA rolled out a national housing relief programme to rebuild or repair destroyed houses, prioritising poor and vulnerable households (e.g., reconstruction of two-room and one-room flats across all four regions).</p>	<p>ReliefWeb, UN Office for the Coordination of Humanitarian Affairs (2021)</p>
Other comments		
3. FINANCIAL DISRUPTION		
Impacts on the banking sector	<p>Borrower stress: The cyclone's strongest impacts were on agriculture and forestry, transport services, ICT and tourism, which were key income sources for households and SMEs. This raised short-term repayment stress and created restructuring needs for affected borrowers.</p> <p>Operational disruption channel: ICT service disruptions and damaged infrastructure affected payments connectivity and banking service delivery, including branches and digital channels.</p> <p>Financial companies affected: Reports confirmed that financial companies were among the entities affected by the disaster, though bank-level metrics (NPLs, impairments, liquidity ratios) were not published.</p> <p>Scope note: Comprehensive data on specific banking sector impacts in Eswatini was limited, as assessment efforts focused primarily on immediate humanitarian response rather than financial sector analysis.</p>	<p>Ministry of economic planning and development (2022)</p> <p>UN OCHA (2021)</p>
Impacts on the insurance sector	<p>Claims increased: The event caused widespread damage to built infrastructure and utility networks, plus loss of lives and livelihoods. This was consistent with higher property, motor, and business interruption claims where cover existed.</p> <p>Large asset-loss base: Total economic losses were estimated at E226.3 million, with public infrastructure damage amounting to E153.2 million and private-sector infrastructure damage also reported. This indicated a substantial physical-loss footprint relevant to non-life insurance, though losses were not split into insured versus uninsured in available documentation.</p>	<p>Government of Eswatini (2021)</p> <p>The Citizen (2021)</p> <p>News24 (2021)</p>
Impacts on financial markets, at local or global scale		
Impacts on public finances	<p>Emergency expenditure: Government resources were required for immediate disaster response, damage assessments, and infrastructure repairs (roads, bridges, water systems).</p> <p>Water system repairs: Damage to potable water infrastructure in Mbabane, Lobamba, and Siteki necessitated public investment in repairs, though specific fiscal figures were not published.</p> <p>NDMA activation costs: The National Disaster Management Agency's response operations, including early warning systems and coordination efforts, required public funding.</p>	<p>UN OCHA (2021)</p>
Other comments		

7. Tropical Cyclone in Fiji (2016)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

Disclaimer: The NGFS strives to disseminate accurate and up-to-date information and will correct any errors brought to its attention where possible. However, it cannot be held liable in any way for the use or interpretation of the information contained in this publication.

Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Tropical Cyclone Winston (TC Winston).	
Date of occurrence for the event described in this survey	20 February 2016.	
Geographical scale of occurrence for the event	National.	
Type of hazard for the event	Tropical Cyclone – extreme windspeed, flooding by storm surges.	
Magnitude and length	<ul style="list-style-type: none"> • TC Winston – a Category 5 cyclone with maximum average wind speeds reaching 233 km/hour, and wind gusts peaking at around 306 km/hour. • On February 10, TC Winston was located to the west of Fiji. Over the next 10 days, it moved first to the south of Fiji, then to the east before stopping and reversing course 180°. • It was after this about-face that the storm explosively strengthened under very conducive atmospheric and oceanic conditions. • TC Winston made landfall on 20 February in the north of one of the two main islands – Vitilevu. 	<p>Fiji-Climate-Vulnerability-Assessment.pdf</p> <p>Tropical Cyclone Winston causes devastation in Fiji, a tropical paradise NOAA Climate.gov</p>
Impact on population of the hazard	<ul style="list-style-type: none"> • TC Winston impacted approximately 540,000 people (62% of the country's population). • 44 lives were lost. • Approximately 40,000 people required immediate assistance, and about 30,300 houses, 495 schools, and 88 health clinics and medical facilities were damaged or destroyed. 	Fiji-Climate-Vulnerability-Assessment.pdf
Which and how economic agents were primarily affected	<ul style="list-style-type: none"> • One in five households lost a significant share of their personal belongings and had their homes damaged or destroyed. As most cannot afford to carry personal or house insurance, many households faced the burden of rebuilding their homes with the limited personal savings they had. • The total value of disaster effects for the commerce sector (i.e. wholesale and retail sectors) was estimated as F\$10.4 million (F\$2.5 million : destroyed assets, and F\$7.9 million decline in sales). • For the manufacturing subsector, the estimated value of destroyed assets was F\$132.4 million, of which \$70.4 million was destroyed assets, and \$62.0 million was the value of a decline in production. • Tourism: Of the 400 national tourism businesses, at least 75 were significantly damaged (mainly accommodation providers) Structural damage was estimated at \$76 million. Businesses were estimated to have lost \$44 million through cancellations and bookings. 	<p>Fiji-Climate-Vulnerability-Assessment.pdf</p> <p>Post Disaster Needs Assessment – Fiji</p> <p>Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 (Online Version).pdf</p>

Overview of how the economy in was affected, with a focus on most impacted sectors

- TC Winston hit Fiji on 20 February 2016 with devastating impact on the economy. Much of the destruction occurred in the agricultural sector. The sugar industry in these areas sustained significant damage as did most other crops.
- Similarly infrastructure was badly hit causing prolonged disruption to electricity, water supply and telecommunications in the same areas.
- There was extensive damage to thousands of homes which were in the path of the category 5 cyclone, leaving many communities without shelter and, in most cases, their sources of livelihood.
- TC Winston cost Fiji a total of approximately \$2.9 billion in damages and losses (including environmental impact).
- TC Winston produced different effects across the various sectors, with the most significant impacts felt by the productive and social sectors.
- The individual sectors that sustained the greatest damage were housing, accounting for 58 percent of total damage costs, followed by transport, accounting for 10 percent of all damage.
- The highest level of production losses expected was in the agriculture sector at 65 percent of total losses.

[Press Release No 7 - Fiji Economic Performance Expected to Remain Positive - Reserve Bank of Fiji](#)

Post Disaster Needs Assessment – Fiji

[Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 \(Online Version\).pdf](#)

Reserve Bank Annual Report 2016

[RBF Annual Report 2016 - Reserve Bank of Fiji](#)

Any other key characteristic deemed relevant

N/A.

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact

GDP / Total GVA (gross or in %)

- TC Winston inflicted combined damage and production losses equivalent to roughly 30% of Fiji's GDP, of which 85 percent was borne by the private sector. GDP growth slowed to 0.4% in 2016, down from 3.8% the previous year in 2015.
- The total impacts were estimated at FJ\$2.98 billion (US\$1.4 billion), disrupting agriculture, infrastructure, housing.

Fiji Post Disaster Needs Assessment :

[Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 \(Online Version\).pdf](#)

<https://www.imf.org/-/media/files/countries/resrep/pis-region/small-states-monitor/032717.pdf>

	Public	Private	Total
Agriculture, Commerce, Tourism and Mining	1.0	7.5	8.5
Education, Health and Housing	1.0	7.8	8.9
Transport, Water and Electricity	2.1	0.4	2.5
Environment and Culture	0.3	8.9	9.2
Total	4.5	26.6	29.2

Source: Post-Disaster Needs Assessment, Government of Fiji.

- Pre-cyclone forecasts projected 3.5% GDP growth for 2016, which was revised down to 2.4% post-event.

Quantitative estimates of the natural hazard's impact

Inflation rate (in pp)

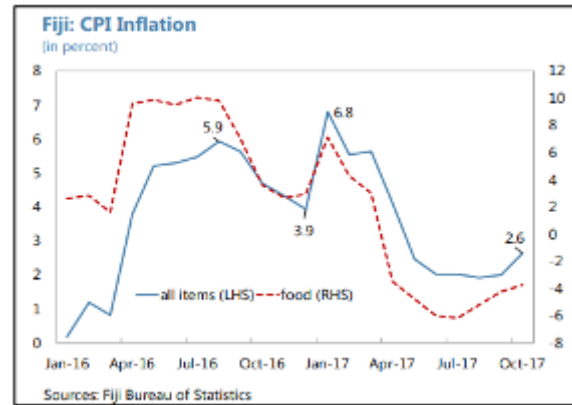
- Following Winston, food prices rose sharply. Headline inflation increased to 5.9 percent y/y in August 2016 before moderating by end 2016. Inflation picked up to 3.8 percent in April 2016 and remained above the 5.0 percent mark for five consecutive months thereafter before falling to 4.7 percent in October. The higher inflation in these months was largely caused by a shortage of agricultural items (mainly fruit, vegetables and yaqona (Fiji's traditional drink)) due to the damage sustained from the natural disaster.
- A significant number of yaqona plantations in the main supply areas in Fiji (particularly Taveuni, Rakiraki and Koro Island) were destroyed. The increased cost of yaqona, driven by supply constraints, significantly contributed to the overall inflation rate, impacting household expenditure. However, yaqona prices only began to increase from April 2016, not earlier, likely due to farmers salvaging remaining plants to avoid rot and maintain supply in the market.
- Although headline inflation temporarily increased, the jump was mainly a reflection of the slow recovery of food production.

IMF – Republic of Fiji: Staff Report for the 2017 Article IV Consultation

[Republic of Fiji: Staff Report for the 2017 Article IV Consultation in: IMF Staff Country Reports Volume 2018 Issue 034 \(2018\)](#)

Reserve Bank of Fiji Newspaper Article Fiji Sun 2019:

<https://www.rbf.gov.fj/wp-content/uploads/2019/05/Fiji-Sun-The-recent-Natural-disaster-Yaqona-prices-inflation-101216.pdf>



Quantitative estimates of the natural hazard's impact	Unemployment rate (in pp)	<ul style="list-style-type: none"> • TC Winston had a temporary impact on Fiji's unemployment, particularly in the informal and subsistence sectors. Destruction of crops, homes, and livelihoods led to short-term job losses, jobs with reduced income in the agriculture and related areas. Although no precise post-event unemployment spike was recorded, the demand for construction workers surged significantly due to extensive rebuilding needs. • The increase in construction workers was further amplified with the implementation of Government programmes such as the «Community Based Emergency Employment», targeting reconstruction of public and community infrastructure, while training semi-skilled builders and carpenters in «Build Back Safer» techniques. • A total of 554 short-term job losses in the formal sector was reported in manufacturing companies during the two weeks after the cyclone. The jobs were reinitiated once the electricity supply was fully restored. Other affected businesses that were partially damaged continued operations at reduced capacity or reopened within a couple of weeks. The handful of businesses that were severely damaged remained closed for an extended period. 	<p>Global Shelter Cluster : SP15-16_A15-Fiji-2016.pdf</p> <p>Fiji Post Disaster Needs Assessment : Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 (Online Version).pdf</p>
	Total import & export (gross or in %)	<ul style="list-style-type: none"> • Fiji's current account deficit in 2016 was 5 percent of GDP, about 1.4 percent of GDP larger than 2015. The widening current account deficit in 2016 was mainly driven by the decline in exports (especially in agriculture sector) after Cyclone Winston and by the increase in imports stemming from post-Winston reconstruction. • This decline was driven primarily by expected decreases in sugar, dalo, coconut oil and yaqona exports. The yaqona plantations sustained damage to both young and mature plants as the plant yields maturity after about 3 years. In addition, coconut oil exports were expected to significantly decline in the short to medium term. • Imports were driven by the inflow of machinery, equipment and materials for reconstruction for the replacement of infrastructure in the housing, telecommunication and transport sectors. 	<p>IMF's Article IV Consultation 2017 Republic of Fiji: 2017 Article IV Consultation – Press Release; Staff Report; and Statement by the Executive Director for The Republic of Fiji; IMF Country Report No. 18/34; January 10, 2018</p> <p>Fiji Post Disaster Needs Assessment : Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 (Online Version).pdf</p>

Quantitative estimates of the natural hazard's impact

Others

- Fiji's public debt-to-GDP ratio increased to 50 percent by end July 2018. In 2016, public debt was reported at 47%. However, post TC Winston and other natural disasters that followed, public debt steadily increased.
- According to former Minister for Economy – "Sayed-Khaiyum says that a major factor behind the increase in government's debt to GDP percentage to 50% in 2018 was the expenditure of around \$500 million from 2016 to 2018 to address the damages from tropical cyclones."
- Government expenditure on disaster relief and early recovery activities are being funded through reprioritization of line ministry budgets. Notable reallocations included top ups for social welfare programmes and food ration distribution.
- The financial sector remained sound as the Reserve Bank maintains a fine balance between ensuring our financial institutions are healthy and providing supportive monetary and interest rate conditions for growth.
- The RBF maintained its policy rate at 0.5 percent since 2011. Average lending rates declined by about 2 percent during 2011-13, and have been stable since 2014. The combination of lower lending interest rates and strong GDP growth propelled credit growth to the private sector to about 15 percent in 2014-15. Credit growth slowed down somewhat after Winston.

Fiji Village News :

[Fiji's debt to GDP percentage disrupted by devastation caused by Natural Disasters](#)

RBF Press Release 2017 No. 07

[Press-Release-No-7-Fiji-Economic-Performance-Expected-to-Remain-Positive.pdf](#)

Fiji Post Disaster Needs Assessment :

[Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 \(Online Version\).pdf](#)

Quantitative estimates of the natural hazard's impact

Sectoral GVA for impacted sectors

- The estimated value of disaster effects arising from TC Winston in Fiji was reported at F\$1.99 billion (US\$0.9 billion), including F\$1.29 billion (US\$0.6 billion) in damage (i.e., destroyed physical assets) and F\$0.71 billion (US\$0.3 billion) in losses.

Fiji Post Disaster Needs Assessment :

[Post Disaster Needs Assessments CYCLONE WINSTON Fiji 2016 \(Online Version\).pdf](#)

Table 1: Summary of Disaster Effects by Sector

	Disaster Effects (F\$ million)			Share of Disaster Effects* (%)	
	Damage	Losses	Total	Public	Private
Productive Sectors	241.8	594.5	836.3	12	88
Agriculture	81.3	460.7	542.0	7	93
Commerce and Manufacturing	72.9	69.9	142.8	49	51
Tourism	76.1	43.9	120.0		100
Mining	11.5	20.0	31.5		100
Social Sectors	827.9	40.0	867.9	12	88
Education	69.2	7.4	76.6	100	
Health	7.7	6.2	13.9	100	
Housing	751.0	26.4	777.4	2	98
Infrastructure Sectors	208.2	40.4	248.6	84	16
Transport	127.1	2.4	129.5	98	2
Water and Sanitation	16.9	7.9	24.8	100	
Electricity	33.0	8.1	41.1	100	
Communications	31.2	22.0	53.2	30	70
Cross-Cutting Issues	239.6	660.1	899.7	4	96
Environment ¹	232.5	629.8	862.3		100
Culture and Heritage	5.1	0.8	5.9	23	77
Disaster Risk Management	2.0	29.5	31.5	100	
Total (Excluding Environment ¹)	1,285.0	705.2	1,990.2	78	22
Grand Total	1,517.5	1,335.0	2,852.5	84	16

Sectoral production for impacted sectors

N/A.

Food price index

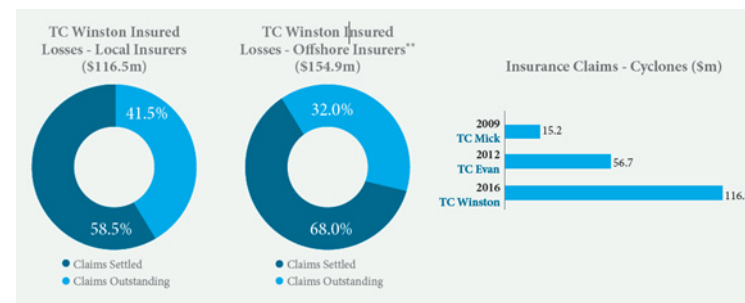
N/A.

Quantitative estimates of the natural hazard's impact

Insured and uninsured losses, in volume and in % of total losses

- Although the gross premium income of the general insurance industry grew over the year, overall profitability and solvency surplus recorded declines attributed to a significantly high level of losses from both natural and manmade disasters. All general insurance companies however continued to comply with the minimum solvency requirements under the Insurance Act 1998.
- Claims – TC Winston losses led to the increase of 27.8 percent in the insurers' net claims paid.
- The general insurers recorded a consolidated after-tax net loss of \$18.9 million in 2016 (2015: net profit after tax of \$30.4m), mainly attributed to the increased levels of reinsurance outwards and net claim payments during the year.

RBF Insurance Annual Report 2016:
<https://www.rbf.gov.fj/insurance-annual-report-2016/>



Other relevant variables N/A.

Contagion and international spillover effects observed following the event

Broad spillover effects:

Tourism – tourist booking cancellations were recorded immediately after TC Winston, estimated at 30-40%. These cancellations were made despite major accommodation providers not being impacted.

Agriculture Sector – decline in exports to designated markets, causing possible supply chain issues.

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<ul style="list-style-type: none"> • Fiji implemented swift public measures post-Tropical Cyclone Winston in 2016 to mitigate impacts and boost recovery, focusing on immediate relief, financial support, and infrastructure rebuilding. • Budget reallocations and new bond issuances (including the first ever FJ100m Sovereign Green Bond issuance) funded reconstruction without exceeding debt limits. • The Fiji National Provident Fund (FNPF), 9 days after TC Winston, allowed affected members to withdraw \$1,000 through a simplified process for post cyclone assistance and up to \$5,000 for 'Quick Repairs housing assistance'. This was subsequently extended to all members, who wished to help their immediate family in affected areas. The facility was open for 60 days to the end of April 2016. As of 14 April 2016, the FNPF had paid out a total of \$259.3 million for 173,836 applications. • The Reserve Bank of Fiji reactivated its concessionary Natural Disaster Rehabilitation Facility in the wake of the immense devastation left behind by Tropical Cyclone Winston. • Fiji also introduced targeted tax relief measures post-Tropical Cyclone Winston in 2016 to ease burdens on individuals, businesses, and donors aiding recovery. Customs waived fiscal duty, import excise, and VAT on goods consigned for Winston victims until April 21, 2016, facilitating relief imports without tax barriers. 	<p>Ministry of Economy – Disaster Recovery Framework:</p> <p>World Bank Document</p> <p>RBF Press Release:</p> <p>https://www.rbf.gov.fj/press-release-no-4-rbf-reintroduces-natural-disaster-facility-to-assist-businesses-affected-by-tropical-cyclone-winston/</p> <p>FRCS – Customs and Taxes Relief for all Fijians:</p> <p>https://www.frccs.org.fj/wp-content/uploads/2016/01/CUSTOMS-AND-TAXES-FOR-TC-WINSTON-RELIEF-1.pdf</p>
Other comments	N/A	

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<ul style="list-style-type: none"> • The trend in the NPLs ratio (from 1.1% in 2015 to 1.2% in June 2016) so far suggests that the impact on the financial system has been minimal. This is largely because major industries such as tourism, retail, manufacturing, building & construction and real estate, which have a significant exposure to the financial system, were not directly impacted by TC Winston. • The impact on commercial banks, in terms of operations has been minimal with 65.0 percent of the banks' branches open for business, following the removal of the curfew on 22 February 2016. 	<p>Financial Stability Review 2016 - Reserve Bank of Fiji</p>
Impacts on the insurance sector	Refer to earlier comments on insurance industry.	
Impacts on financial markets, at local or global scale	N/A.	
Impacts on public finances	Refer to earlier comments in Economic section.	
Other comments	N/A.	

8. Drought in France (2022)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	In 2022, France experienced an unprecedented drought-heatwave event characterized by a combination of several factors over a long period of time and affecting almost the entire country: a rainfall deficit (which continued into the winter); record-breaking heat waves; severe soil drought; and severely depleted groundwater levels.	
Date of occurrence for the event described in this survey	<p>Several heatwaves impacted France during summer 2022:</p> <ul style="list-style-type: none"> – June 14-19. – July 12-25. – July 31-August 13. <p>France also experienced a heatwave between September 12 and 14, 2022. However, according to Météo France, this episode did not officially reach the statistical and climatological threshold to be classified as a “heatwave” on a national scale (which requires the national temperature indicator to exceed 23.4 °C for at least three consecutive days).</p> <p>It is more difficult to provide a precise date of occurrence for the 2022 droughts, but Metéo France estimates that droughts started in March 2022 up until November 2022 (8 months).</p>	Météo France (2022)
Geographical scale of occurrence for the event	Regional. These events happened throughout the European continent with differentiated but overall, very high intensity.	Copernicus (2022)
Type of hazard for the event	The main hazards described here are heatwaves and droughts, but they compounded with wildfires as well.	
Magnitude and length	Summer 2022 was the summer with the biggest cumulated recorded days of heatwaves (33 days). Across France and for the season as a whole, the average temperature of 22.7 °C was 2.3 °C above normal. On June 18, the average maximum temperature in France was 36.2 °C, and 37.6 °C on July 18. The rainfall deficit compared to the 1991-2020 average was 25%, making 2022 the second driest year since 1959. May, with a deficit of 60%, and July, with a deficit of 85%, were the driest months ever recorded in France since measurements began in 1959.	Météo France (2022)
Impact on population of the hazard	Over the entire summer monitoring period, 10,420 excess deaths from all causes (+6.1%) were estimated in mainland France. Part of this excess summer mortality is likely due to the population’s exposure to temperatures that did not reach heatwave thresholds, so the number of attributable deaths only to heatwaves is likely lower. EM-DAT indicates 4 807 deaths for the heatwave events.	Santé Publique France (2022)
Which and how economic agents were primarily affected	Households were primarily affected through water supply restrictions (for which a socio-economic cost is hard to determine) and their real estate assets which were damaged by clay shrink swell events in some areas. A vast part of French households was affected by water supply restrictions, limiting water availability to priority uses only (health, civil safety, drinking water). Water supply restrictions were unevenly distributed across French territory and did not necessarily last the same amount of time between regions. Companies from various sectors were also impacted by water supply restrictions. Some report a 40% drop in revenue in the summer of 2022 compared to the previous summer. Industrial companies were generally able to adapt. However, some companies had to implement partial closures (one day per week) during the season.	Ministère Aménagement du territoire et transition écologique (2025)

Overview of how the economy in was affected, with a focus on most impacted sectors	<p>The most impacted sectors are the energy production sector and the agricultural sector, but the final cost of the events of 2022 is undoubtedly even higher than the sum of the damages to these two sectors. Certain direct effects are not easy to capture, such as those on river transport of goods, tourism, and industry, due to the difficulty of isolating the impact of the drought and heatwaves on these sectors.</p> <p>Energy production: By drying up rivers and reducing the level of reservoir lakes, droughts also affect hydroelectric production, France's second largest source of electricity. This reduction in the water resources available for energy production, exacerbated by conflicts of use, particularly with the agricultural sector, leads to a direct decline in hydroelectric production.</p> <p>Nuclear power plants need water from nearby rivers to cool their reactors. During periods of drought, river levels are lower and temperatures higher. Nuclear power plants may then be shut down so as not to further dry up the rivers or affect ecosystems by releasing even warmer water into the environment. The decrease in production specifically caused by drought appears to be limited, with EDF estimating it at 0.5 TWh (0.2% of annual production).</p> <p>Agricultural sector: In 2022, extreme weather conditions (rainfall deficit, high evaporation, low soil moisture, reduced availability of water resources) reduced the yield of certain crops that are highly dependent on climatic conditions.</p>	Ministère Aménagement du territoire et transition écologique (2025)
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Any other key characteristic deemed relevant

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)		
	Inflation rate (in pp)	While no estimate of the impact on headline inflation is available for France, Kotz et al. finds that 0.34 percentage-points (0.18-0.41 across empirical specifications) on headline inflation and 0.67 percentage-points (0.43-0.93) on food inflation in Europe due to the 2022 events.	Kotz et al. (2024)
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
Others			
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	<p>The economic loss due to the drought of 2022 is estimated to reach €532 million in terms of GVA for the hydroelectric sector.</p> <p>The decline in agricultural yields attributable to the drought of 2022 would have resulted in an estimated loss of production of €1.1 billion compared to the 2017-2021 average, representing a loss of agricultural added value of €459 million.</p>	Ministère Aménagement du territoire et transition écologique (2025)

Quantitative estimates of the natural hazard's	Sectoral production for impacted sectors	<p>In 2022, hydroelectric production fell by 12.3 TWh compared to its 2017-2021 average, dropping from 61.9 to 49.6 TWh (-20%).</p> <p>Decrease in nuclear energy due to the drought is much more difficult to quantify, as the French nuclear power plants experienced additional stress unrelated to this hazard, leading to nearly half of total capacity being shut down in summer 2022. EDF estimates that 0.5 TWh (0.2% of annual production) of electricity production was lost specifically due to the drought.</p> <p>The decline in agricultural yields attributable to the 2022 drought is estimated to have resulted in a loss of production estimated at €1.1 billion compared to the 2017-2021 average.</p>	ECB (2023)
Food price index		Insured and uninsured losses, in volume and in % of total losses	Caisse centrale de réassurance (2025)
		<p>Since 1982, France has had a specific insurance scheme for natural disasters (including those related to climate change but not limited to them): the Cat-Nat (Natural Catastrophe) regime. The Cat-Nat compensation scheme is financed on the principle of national solidarity. All policyholders contribute via a mandatory surcharge on property insurance (home insurance, car insurance), even if they do not live in an area exposed to natural disasters. This national solidarity allows risk to be pooled at the national level, thereby avoiding a sharp increase in insurance premiums in areas most exposed to natural disasters.</p> <p>The year 2022 saw very high losses under the Cat-Nat regime, estimated by CCR at around €3.9 billion. The 2022 drought alone accounted for more than 95% of the cost for the year, with an estimated €3.6 billion. The claims from this event are the highest ever recorded by the Cat-Nat regime since 1982.</p> <p>Regarding uninsured losses, we could not find estimates related to this precise event.</p>	
Other relevant variables			
Contagion and international spillover effects observed following the event			

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>Water supply restriction: Restrictions in the event of drought in France are implemented progressively according to four levels of severity: vigilance, alert, heightened alert, and crisis, which is the ultimate level. On August 9, 2022, 63 departments were in “crisis,” the highest alert level, and on August 25, 78 departments were affected, representing approximately 19 million households for at least two weeks. At this level of restriction, only priority uses of water are authorized (health, civil security, drinking water). Non-priority withdrawals, representing 12% of household consumption, are prohibited.</p> <p>National public compensation schemes for farmers: There are several public compensation mechanisms in France that were activated following the 2022 events. The agricultural disaster relief program aims to provide compensation, financed by the National Agricultural Risk Management Fund (Fonds National de Gestion des Risques en Agriculture – FNGRA), to farms that have suffered crop losses or financial losses due to weather conditions and that meet the eligibility requirements. To be eligible for compensation, crop losses must meet two thresholds: a physical loss rate of 30% (changed to 20% since 2023) of annual production (or 42% for crops benefiting from coupled support under the Common Agricultural Policy (CAP)) compared to the theoretical yield of all crops comprising this production; and damage exceeding 13% (lowered to 11% in 2022) of the farm’s theoretical gross income, including CAP support. Given the severity of the drought and the difficulties faced by livestock farmers, the government has raised the compensation rate from 28% to 35% for the first time in 2022. The government spent €250 million for the FNGRA following various adverse events in 2021 and 2022 (frost, hail, and drought).</p> <p>Nat Cat regime: Although not a direct compensation scheme, the French state is indirectly involved in the Nat Cat regime as CCR, a public reinsurer, is authorized to provide insurers who request it with unlimited reinsurance coverage while being backed by the government.</p> <p>Local measures: in addition to pre-established schemes that were activated, some more targeted measures were taken in particularly affected areas. For example, to support farmers in Lozère, it was also decided to exempt them from the property tax due for 2022.</p>	Ministère Aménagement du territoire et transition écologique (2025)
Other comments		

3. FINANCIAL DISRUPTION

Impacts on the banking sector
Impacts on the insurance sector
Impacts on financial markets, at local or global scale
Impacts on public finances
Other comments

9. Flood in France (2016)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	The event corresponds to exceptionally intense and persistent rainfall that occurred in France between late May and early June 2016, leading to widespread flooding, mainly in the Seine and Loire River basins. Following an already abnormally wet spring, soils were saturated, amplifying surface runoff and river overflow. Numerous tributaries experienced rare to exceptional floods. The Seine reached 6.10 m at Paris-Austerlitz, its highest level since 1982, narrowly avoiding flooding of central Paris.	Ministère de l'environnement, de l'énergie et de la mer (2016)
Date of occurrence for the event described in this survey	The event occurred between 25 May and 6 June 2016. Peak hydrological impacts were recorded between 30 May and 4 June 2016.	Banque de France (2025)
Geographical scale of occurrence for the event	<p>The event occurred between 25 May and 6 June 2016. Peak hydrological impacts were recorded between 30 May and 4 June.</p> <p>The floods affected approximately fifteen French departments, mainly located in Île-de-France and Centre-Val de Loire, including Paris and several medium-sized cities. The scale was regional to multi-regional. Bank of France has developed a Digital Twin model which allows to identify the main affected areas and agents at a granular level. The results of the model and the areas described in the literature are coherent.</p> <p>Departments affected: 18, 28, 36, 37, 41, 45, 89, 75, 77, 78, 91, 92, 93, 94, 95.</p> <p>Most affected cities: Montargis (45), Nemours (77), Melun (77), Moret-sur-Loing (77) and Longjumeau (91), Villeneuve-Saint-Georges (94).</p> <p>River overflowing: the Seine, the Loing, the Yvette, the Yerres, the Bièvre.</p>	
Type of hazard for the event	The hazard consisted primarily of fluvial flooding caused by river overflow due to heavy rain, combined with surface runoff flooding due to soil saturation, locally aggravated by infrastructure weaknesses.	
Magnitude and length	<p>The month of May 2016 was thus characterized by record rainfall in the Centre and Île-de-France regions (178.6 mm in Paris, 180.8 mm in Orleans, for instance), especially due to heavy rainfall in the end of May. Afterwards, several rivers have overflowed including the Seine, which reached 6.10 meters in Paris Austerlitz on June 4th 2016 at 2 o'clock : it was the highest flood level of the Seine since 1982.</p> <p>The Digital Twin model takes as input satellite-based data and maps from Copernicus EMS mapping to reflect the total flood extent of the event and therefore calculate the (direct asset) exposures/losses.</p>	
Impact on population of the hazard	Almost 20 000 people were evacuated. Social disruptions were significant in the affected areas. 24 people were injured and 4 people died.	
Which and how economic agents were primarily affected	Households, SMEs, retailers, artisans, transport and tourism operators, and local authorities were the most affected, mainly through business interruption and loss of turnover. With our Banque de France digital twin model on the most affected departments (45, 77, 91, 94), we find that around 5 800 producing premises were localized in the flooded area (using satellite data with an accuracy of 20 meters), owned by around 5 500 companies.	Banque de France (2025)

Overview of how the economy in was affected, with a focus on most impacted sectors	The most impacted sectors included retail, services, inland transport, tourism, construction supply chains and local public services. Tourism and inland navigation were particularly affected due to the timing of the flood. After identifying affected firms with the Banque de France digital twin model, we find that the average sales growth is lower in the annual firms' balance sheet of 2016 for firms affected by the flood than for their sectoral counterparts in the following sectors: real estate activities, scientific activities, retail, manufacturing, ICT, energy and transport (but not on administrative, financial, artistic, construction, accommodation and catering, health). As explained in De l'Estoile et al. (2025), flood affect relatively strongly machines and equipment. The sectors depending on them may have needed more time to catch up from the 2016 flood event.	Ministère de l'environnement, de l'énergie et de la mer (2017)
Any other key characteristic deemed relevant	In 2016, the event became the second most costly natural disaster under the French CatNat regime, with insured losses around €1.2 billion.	

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	No material impact on national GDP was identified. The economic impact was significant but localized. Based on the (rather coherent) economic losses published by CAT DAT, EM DAT, and Swiss RE databases, the economic losses are about 2,6 bn€, which represent approximately 0,1% of the GDP.	
	Inflation rate (in pp)	No measurable impact on national inflation was documented.	
	Unemployment rate (in pp)	No significant impact on national unemployment; effects were temporary and local. While the unemployment rate dropped by 2 pp from Q1 to Q2 2016 at the national level, it has only reduced by 1,30 p.p. in the affected departments and even remain stable in Indre, Loiret and Yvelines. Data are corrected for seasonal changes.	
	Total import & export (gross or in %)	No measurable national impact; temporary logistics disruptions occurred locally. In 2016, the drop in cereal sales (-17,9% at 6,8 Md€) is partly explained by heavy rainfall in spring (affecting grain quality).	
	Others	NA	
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	Inland navigation freight declined by about 22.7 million tonne-km; tourism lost around €13 million in turnover.	Ministère de l'environnement, de l'énergie et de la mer (2016)
	Sectoral production for impacted sectors	NA	
	Food price index	NA	
	Insured and uninsured losses, in volume and in % of total losses	Insured losses estimated between €900 million and €1.4 billion, probably around 1,2 billion € in total; uninsured losses include business interruption and public infrastructure. BDF Digital Twin micro-level estimations find 380 billion € for NFCs (most of it being equipment destruction) and €289 billion for housing damages. The most affected sectors in terms of direct losses on assets were Retail and Gross Trade, Construction and Manufacture.	Banque de France (2025)
	Other relevant variables	NA	

Contagion and international spillover effects observed following the event	This flooding came as a surprise at a particularly important time for the river sector (especially for construction, agriculture and tourism), blocking activity for 15 days and particularly affecting the river transport route to Le Havre, one of France's main ports open to international trade. In particular, a dip in grain shipments from the port of Le Havre has been observed in 2016 (-20% YoY). The decline in cereal sales explains part of the drop in exports to Africa and the Near and Middle East.	
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	CatNat activation, emergency aid, targeted sectoral support, though some delay (2-3 months) was often observed in the actual payment of the financial support to the businesses.	Ministère de l'environnement, de l'énergie et de la mer (2016)
Other comments		
3. FINANCIAL DISRUPTION		
Impacts on the banking sector	<p>No systemic banking stress; mainly short-term liquidity support to NFC and households. Based on Digital Twin and French credit register, the outstanding amount of banking loans exposed to affected firms reached €36 billion in June 2016 (around 2.5% of total banking exposure to NFCs).</p> <p>The French agricultural social security system (MSA) has deferred contributions for one year for all farms with an annual income below €4,248, representing nearly a quarter of farmers in the Île-de-France region. Crédit Agricole and Crédit Mutuel have committed to deferring annual loan repayments and to spreading out loans taken out for the purchase of agricultural machinery and equipment.</p>	Banque de France (2025)
Impacts on the insurance sector	<p>Major insured losses; strong reliance on CCR; gaps in business interruption coverage. With the help of Digital Twin, BdF analyzed the asset exposures of the insurance sector in 2016. Though no specific asset losses were experienced at that time, the asset exposures to companies for which at least one entity was affected by event was material (93 bn € compared to 2,543 bn € of total assets).</p> <p>These exposures are mostly to large international companies, at holding level, resulting in a very limited actual impact. The cost for the insurance sector was 1.2 billion euros (1.4 billion euros including unharvested crops).</p>	Banque de France (2025)
Impacts on financial markets, at local or global scale	No observable impact on financial markets; while this flood caused ad hoc damage to banking networks, it did not cause major disruptions as the financial sector was able to ensure the continuity of its activities.	Banque de France (2016)
Impacts on public finances	Government subsidy: 253 companies across all sectors received a subsidy (9 of which received more than €3,000) for a total amount of aid of €671,000.	Ministère de l'environnement, de l'énergie et de la mer (2016)
Other comments		

10. Storm in Germany (2021)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	On July 14 and 15 2021, a massive flood hit Western Europe and caused widespread devastation in Germany, Belgium, the Netherlands, France, and Luxembourg. In Germany, the western and southern parts were affected with the Ahr Valley (Ahrtal) being particularly severely exposed. The total damage caused by the flood in German regions is estimated to be at least 33 billion Euros.	
Date of occurrence for the event described in this survey	On July 14 and 15 2021.	
Geographical scale of occurrence for the event	Western Europe and caused widespread devastation in Germany, Belgium, the Netherlands, France, and Luxembourg.	
Type of hazard for the event	Flood.	
Magnitude and length	In some areas of Rhineland-Palatinate and North Rhine-Westphalia, up to 94.5 liters of rainfall per square meter were recorded within 24 hours – an amount exceeding the region's typical total rainfall for the entire month of July. This heavy rainfall combined with already saturated soil and steep topography intensified the destructive force of the floodwaters.	
Impact on population of the hazard	More than 183 people dead; 800 injured in Germany.	Westdeutscher Rundfunk Köln (2024)
Which and how economic agents were primarily affected	Households, companies and infrastructure. Event did have some limited impact on affected firms' financials but the disaster did not have any systemic impact on the banking system.	
Overview of how the economy in was affected, with a focus on most impacted sectors	Tourism, agriculture.	
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	The overall damages from the Ahr Valley flood to households, businesses, and public infrastructure are estimated at €33 billion – equivalent to nearly 1% of Germany's 2021 GDP.	Bundesministerium des Innern (2021)
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses		
	Other relevant variables		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery			
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>Impact on banks in disaster regions Banks directly located in disaster regions have the greatest exposure to any risk materialization from the flood. In total, 16 cooperative banks and 4 savings banks could be identified as being directly located in the disaster regions. Comparing lending volumes for the group of affected cooperative banks with non-affected cooperative banks does not reveal significant differences. The same is true for cooperative banks' CET1 capital. The flood's immediate impact on the solvency and resilience of local banks was thus fairly limited.</p> <p>One noteworthy observation is that in the quarter following the flood disaster, the affected savings banks (Sparkassen) reported a negative result, whereas the control group in the sample recorded a positive result. This is primarily attributable to the lower interest income of the affected savings banks. It is also notable that affected Sparkassen released loan loss provisions to a greater extent than those in the peer group.</p> <p>A descriptive analysis covering Q1/2020 to Q1/2022 has been performed. The disaster occurred in Q3/2021. The study compares firms in disaster-affected regions with those in unaffected regions and finds no significant differences in loan volumes between the two groups. In contrast, the analysis identifies divergences in collateral values, loan loss provisions, and non-performing loans (NPLs).</p> <p>Following the disaster, affected regions experienced a contraction in the value of collateral, alongside an increase in loan loss provisions and NPLs. Over the same period, these risk indicators remained stable or improved in unaffected regions, indicating a disaster-specific deterioration in credit risk conditions rather than a broader trend.</p> <p>Because the flooding was highly concentrated in a limited number of regions, the aggregate impact on the banking sector remains contained. Although NPLs in affected areas increased by € 120 million, this rise did not materially affect banking-system-level risk metrics or sector-wide stability.</p> <p>At the bank level, 20 institutions were located in disaster-affected regions. A comparison with banks in unaffected regions reveals no systematic or structural differences in performance or risk indicators between disaster-region banks and their non-disaster counterparts.</p>	
Impacts on the insurance sector	€ 8.75 billion of the losses were insured.	German Insurance Association (2024)
Impacts on financial markets, at local or global scale		
Impacts on public finances	German federal and state governments created a special € 30 billion relief fund. This allocation involved maneuvering around Germany's well-established fiscal orthodoxy – embodied by the "debt brake" (Schuldenbremse) – to secure urgent reconstruction financing.	Bundesministerium des Innern (2021)
Other comments	<p>Impact on borrowers: Given the substantial damage from the flood, it might be expected that banks' corporate borrowers in the affected regions face financial pressure in the aftermath, either through direct damage or disruptions to business activities. This in turn may translate into the realization of banks' credit risk. Data shows that bank lending to affected firms did not behave differently from non-affected ones as a result of the flood. However, collateral values of affected firms declined by 5% after the event, whereas non-affected firms did not show a similar decline. In addition, loan impairments and non-performing loans (NPLs) rose for affected firms in the aftermath of the flood.</p> <p>Although these descriptive patterns suggest that the flood impacted the affected firm's financial situation, the shock was geographically contained. While the value of non-performing loans in the affected regions increased by about EUR 120 million, this is only a small fraction of the banking system's total.</p> <p>Affected individuals, companies, and other institutions were eligible to apply for compensation covering up to 80% of documented damages, with the possibility of receiving full (100%) reimbursement in cases of severe hardship.</p>	Journal of Flood Risk Management (2023)

11. Storm in Greece (2023)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Storm Daniel was a catastrophic cyclone, the deadliest Mediterranean tropical-like cyclone in recorded history, as well as the second-costliest cyclone on record outside of the North Atlantic Basin. Storm Daniel is likely to be the most intense storm, in terms of rainfall, that Greece has experienced since records began in 1930. The epicenter in Greece was the area of Thessaly.	Flooding Copernicus Storm Daniel – Wikipedia s41598-025-03884-x.pdf https://www.mdpi.com/2073-4441/16/7/980
Date of occurrence for the event described in this survey	Around 3-8 September 2023.	He et al. (2024)
Geographical scale of occurrence for the event	The storm affected central Greece (Thessaly), with heavy rainfall and extensive flooding of certain areas. From southeastern Europe, Storm Daniel moved westward over the Mediterranean Sea, where it intensified into a medicane. It went on to impact Libya, where extreme rainfall and flash flooding resulted in dam bursts that flooded the city of Derna.	Flooding Copernicus Storm Daniel hit Greece, Bulgaria and Türkiye Copernicus Copernicus EMS Rapid Mapping Activation Viewer
Type of hazard for the event	Tropical-like cyclone.	Flooding Copernicus
Magnitude and length	Heavy rain fall with 700-800 mm of rainfall received in 24 hours in some areas affected (equal to the total annual rainfall usually received in these areas), breaking observation records. Average of about 360 mm rainfall across the whole area of Central Greece affected. Daniel is likely to be the most intense storm, in terms of rainfall, that Greece has experienced since records began in 1930. Storm Daniel was a 1-in-80 to 1-in-150 year event, depending on the location. The severe rainfall caused floods in an area which exceeded 1,150 km ² .	Flooding Copernicus Post-Analysis of Daniel Extreme Flood Event in Thessaly, Central Greece: Practical Lessons and the Value of State-of-the-Art Water-Monitoring Networks https://www.nature.com/articles/s41598-025-03884-x.pdf
Impact on population of the hazard	17 persons died, 5,000 people misplaced, 640,000 people live in the areas affected.	Flooding Copernicus EMSR692 SituationalReporting
Which and how economic agents were primarily affected	Much of the flooded area was agricultural land, meaning crops and livestock were lost due to the flooding, alongside significant impacts on infrastructure, houses and businesses. Thessaly area accounts for about 12.2% of the gross value added by the agricultural industry of Greece. The floods destroyed the crops and caused serious long-term damage as the thick layer of mud made the soil infertile, taking up to five years to become fully functional again. Future production also affected from destroyed mechanical equipment and fertilisers.	Flooding Copernicus nhess-24-2375-2024.pdf

Overview of how the economy in was affected, with a focus on most impacted sectors	Agriculture mainly, but also tourism, transport, infrastructure, buildings, networks. 70% of the flooded area was agricultural land. The crop most affected by the flooding was cotton; the inundated area of more than 282 km ² comprised ~ 30% of the total area planted with cotton in central Greece. In terms of livestock, estimates of more than 14,000 ornithoids and 21,500 sheep and goats affected. Flooding created conditions for infectious disease risk; displacement & infrastructure strain.		
Any other key characteristic deemed relevant			
2. ECONOMIC DISRUPTION			
Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	1.4% of Total GVA in Greece or €2.9 bn of GDP produced in the areas affected.	economic-consequences-of-the-floods-19-09-23.pdf
	Inflation rate (in pp)		
	Unemployment rate (in pp)	52,000 people unenmployed existed at the time the event ocured and estimates for 10-30% increase in the number of unenmployed.	The impact of storm Daniel and storm Elias on Thessaly's (Greece) labour market. An employment change forecast
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	Please see previous response.	
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses		
Other relevant variables			
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	EU Solidarity Fund with financial assistance of €101.5 mil for reconstruction projects.		European Parliament (2024)
	National subsidies and support measures envelope of €600 mil (more than €459 mil disbursed by December 2025).		Bank of Greece (2024) Civil protection (2025)
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	No significant adverse impact, as cooperative banks in the area managed to support clients, while they were strong enough to do so. Prudential authorities provided temporary suspensions of: a) overdue debts' collections of and payments' arrangements, (b) payment of insurance contributions, installments and payment extensions, and (c) enforcement actions on movable or immovable property for natural persons and businesses hit by Daniel.	Interview of the BoG Governor, 2025
Impacts on the insurance sector	Insurance compensations for damages related to Storm Daniel were estimated to exceed €372 million, based on 7,426 registered damages (mostly property insurance; also motor). This was described as the largest payout for flood/storm damages in Greece since start of collecting comparable data in 1993.	Ekathimerini (2023)
Impacts on financial markets, at local or global scale		
Impacts on public finances		
Other comments		

12. Wildfires in Greece (2023)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	<p>Greece experienced a record-breaking heatwave in 2023 that triggered severe wildfire incidents, one of which was the wildfire in northern Greece (Evros), burning thousands of hectares of the protected Dadia forest (Natura 2000) and releasing a significant load of smoke into the atmosphere.</p> <p>The fire was a restart of a lightning caused fire that had been extinguished but was not guarded properly. The fire progressed under the influence of strong meltemi wind, after a prolonged period of heat stress.</p>	<p>Extreme wildfires over northern Greece during summer 2023 – Part A: Effects on aerosol optical properties and solar UV radiation – ScienceDirect</p> <p>Overview 2023: Greece – Lessons Not Learned – International Association of Wildland Fire</p>
Date of occurrence for the event described in this survey	18 August – 3 September 2023 (~17 days).	Overview 2023: Greece – Lessons Not Learned – International Association of Wildland Fire
Geographical scale of occurrence for the event	Regional.	
Type of hazard for the event	Wildfire.	
Magnitude and length	A total area of 93,000 ha was burnt affecting 58% of the total area of the Dadia National Forest Park. This wildfire stands as the largest blaze ever recorded in the EU by the European Forest Fire Information Service (EFFIS) since the beginning of its data collection, in 2000. It was the result of intense heatwave.	<p>Extreme wildfires over northern Greece during summer 2023 – Part A: Effects on aerosol optical properties and solar UV radiation – ScienceDirect</p> <p>Overview 2023: Greece – Lessons Not Learned – International Association of Wildland Fire</p>
Impact on population of the hazard	<p>21 people died, which were migrants who had entered the country illegally and were trying to move through the forest when they got trapped by the fire.</p> <p>15,000 people have been evacuated and estimates that 90,000 of people have been affected.</p>	<p>The wildfire in the Northeast Greece, one of the largest ever recorded in Europe Copernicus</p> <p>Overview 2023: Greece – Lessons Not Learned – International Association of Wildland Fire</p> <p>Πυρκαγιά – Έβρος: Σοβαρές οι επιπτώσεις στις επιχειρήσεις – Ζημιές σε 120.000 τ.μ. βιομηχανικών κτηρίων – Οικονομικός Ταχυδρόμος – ot.gr</p>

Which and how economic agents were primarily affected	<p>A significant number of both livestock and wild animals were lost (inc. beekeeping and forestry) and important damages were caused to houses, stables, warehouses, vehicles, livestock units, crops, farmland and public infrastructure.</p> <p>Houses and industrial buildings were destroyed. Business disruptions and workers in tourism and agricultural sectors lost income due the business disruptions.</p>	evroslessonslearned_exsummary.pdf
Overview of how the economy in was affected, with a focus on most impacted sectors	<p>120,000 square meters of industrial buildings (mainly warehouses) were damaged.</p> <p>Approximately 90,000 people in the affected area have been affected directly or indirectly.</p> <p>The duration of the fire was long and it was combined with the following:</p> <p>Economic implications</p> <ol style="list-style-type: none"> 1. Constant power cuts and electric voltage drops that burdened businesses with increased labour costs, restarting of production and malfunctions. 2. Serious problems in ventilation systems and production equipment due to the suspended ash deposited in the filters of production equipment. 3. Indirect costs, especially in sensitive precision equipment, due to its replacement. 4. Maintenance/repair work, restoration work on raw materials, etc., with the risk of not being covered by insurance companies, due to the indirect nature of these losses. 5. Lost profits as the electricity was constantly falling and the production was interrupted every now and then batches of products were not produced at the required level of quality. <p>Ecological impact</p> <p>Tourism was severely affected, which will take years to recover, as villages which attract tourists and the forest of Dadia of high ecological significance were destroyed.</p> <p>Social impact</p> <ol style="list-style-type: none"> 1. Workforce was lost. 2. Many crops were lost and cooperatives, such as loggers and beekeepers, are in danger of disappearing. 3. Almost all people who have homes, crops and pastures in this area have suffered damage. 	<p>Πυρκαγιά – Έβρος: Σοβαρές οι επιπτώσεις στις επιχειρήσεις – Ζημιές σε 120.000 τ.μ. βιομηχανικών κτηρίων – Οικονομικός Ταχυδρόμος – ot.gr</p>
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)		
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others	State offered various subsidies to households and businesses affected in order to support reconstruction and repairs.	Πυρκαγιά στον Έβρο (Αύγουστος 2023) – Κρατική Αρωγή
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses		
	Other relevant variables		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	State aid of 86 million euro against soil erosion and flooding.		Νομισματική Πολιτική – Ενδιάμεση Έκθεση 2023
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector			
Impacts on the insurance sector			
Impacts on financial markets, at local or global scale			
Impacts on public finances			
Other comments			

13. Cyclones in Hong Kong

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Over the past few years, Hong Kong experienced record-breaking extreme weather. For example, in September 2023, prolonged torrential rains caused the Hong Kong Observatory to issue the Black Rainstorm Warning for 16 hours and 35 minutes-marking the longest duration since the introduction of the rainstorm warning system in 1992. In 2025, a total of 14 tropical cyclones affected Hong Kong (the average number per year is 6), while the Black Rainstorm Warning was issued five times-both figures exceeding historical records. Such extreme weather has made it increasingly apparent that all sectors, including the banking sector, need to improve their knowledge of physical risk.	Hong Kong Observatory
Date of occurrence for the event described in this survey		
Geographical scale of occurrence for the event		
Type of hazard for the event		
Magnitude and length		
Impact on population of the hazard		
Which and how economic agents were primarily affected		
Overview of how the economy in was affected, with a focus on most impacted sectors		
Any other key characteristic deemed relevant		
2. ECONOMIC DISRUPTION		
Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	
	Inflation rate (in pp)	
	Unemployment rate (in pp)	
	Total import & export (gross or in %)	
	Others	
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	
	Insured and uninsured losses, in volume and in % of total losses	
	Other relevant variables	

Contagion and international spillover effects observed following the event

Public measures taken to mitigate the impact of the disaster or boost the economic recovery

Other comments

3. FINANCIAL DISRUPTION

Impacts on the banking sector

Using EM-DAT data for natural disasters in SAARC region for the time period Q1:2000 to Q2: 2024, it has been found that the small-scale disasters have no impact on the overall CPI of the country. It is only the large disasters whose impact is very high, have been found to impact inflation, and that too in the short run. The large natural disasters increase the inflation in the quarter in which they occur. In the subsequent quarters, the impact of these disasters on inflation is not significant.

We launched the beta version of the platform in May 2024, which provides three functions – Single Asset, Quick Batch and Portfolio Insights – for users to assess physical risk. In the Single Asset function, users can obtain ABCDE risk ratings for an asset at a single location by entering the address or coordinates. The Quick Batch function is similar to the Single Asset function, but with batch processing capacity of up to 30 assets. The Portfolio Insights function allows users to upload a portfolio of up to 20,000 addresses at a time and outputs all detailed risk metrics for users to make further analysis. The beta version covered nine hazards, such as riverine and surface water flood, coastal inundation and extreme wind. The formal version was launched in July 2025, which includes enhancements such as local building characteristics and new tropical cyclone storm surge and landslide models, bringing the total number of hazards to 11.

In addition, the platform contains a database of more than 40 public data or data sources related to physical risk, which banks may download for their own internal assessments.

The platform also provides other risk metrics such as failure probability and productivity loss, so that banks may assess operational loss due to extreme weather impacts on commercial buildings. All assessment results can be visualised through a dashboard featuring an interactive map.

Since the beta launch until end-April 2026, 107 banks have registered for the platform and 1.6 million assets have been analysed. So far, banks' main use cases are climate risk stress testing and portfolio management, but the HKMA also encourages banks to use the platform as an exploratory and capacity building tool.

Impacts on the insurance sector

Impacts on financial markets, at local or global scale

Impacts on public finances

Other comments

14. Cyclone in India (2020)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Super cyclonic storm <i>Amphan</i> .	Report on Currency and Finance 2022-23, RBI (Chapter II) https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=21769
Date of occurrence for the event described in this survey	May 2020.	
Geographical scale of occurrence for the event	<i>Amphan</i> was a natural disaster that originated in the Bay of Bengal and affected the coastal districts of West Bengal and Odisha in India.	
Type of hazard for the event	Cyclone.	
Magnitude and length		
Impact on population of the hazard	Amphan displaced approximately 5 million people.	
Which and how economic agents were primarily affected	<p>Empirical results indicated an increase in credit in districts affected by the cyclone, implying that firms and households need to finance disaster-related rehabilitation/restoration expenses. This can come either from their own savings or by borrowing from the financial institutions, but the results showed no significant change in savings.</p> <p>Moreover, a significant decline in food consumption was observed. This may be due to the need for reconstruction following cyclone-induced damages, with the reconstruction dependent on bank credit and/or the fund received under post-cyclone rehabilitation schemes of the Government.</p> <p>On rural employment side, a decline was observed in the employment demand under MGNREGA. This decline could be because of temporary migration post cyclone owing to the displacement of labour.</p>	
Overview of how the economy in was affected, with a focus on most impacted sectors		
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	
	Inflation rate (in pp)	Using EM-DAT data for natural disasters in SAARC region for the time period Q1:2000 to Q2: 2024, it has been found that the small-scale disasters have no impact on the overall CPI of the country. It is only the large disasters whose impact is very high, have been found to impact inflation, and that too in the short run. The large natural disasters increase the inflation in the quarter in which they occur. In the subsequent quarters, the impact of these disasters on inflation is not significant.
	Unemployment rate (in pp)	
	Total import & export (gross or in %)	
	Others	
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	
	Insured and uninsured losses, in volume and in % of total losses	
	Other relevant variables	
Contagion and international spillover effects observed following the event		
Public measures taken to mitigate the impact of the disaster or boost the economic recovery		
Other comments		

3. FINANCIAL DISRUPTION

Impacts on the banking sector

Impacts on the insurance sector

Impacts on financial markets, at local
or global scale

Impacts on public finances

Other comments

15. Storm in Ireland (2025)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

Disclaimer: The NGFS strives to disseminate accurate and up-to-date information and will correct any errors brought to its attention where possible. However, it cannot be held liable in any way for the use or interpretation of the information contained in this publication.

Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	<p>Storm Éowyn, classified as an extratropical cyclone, made landfall in Ireland on the 24th of January 2025. In advance of the storm, Met Éireann (the State meteorological service) issued a number of weather warnings, culminating in a Red Weather Warning for the entire country. It was the first ever event to trigger red level wind warnings in all parts of Ireland. This storm reached record-breaking wind speeds of over 184 km/h. Storm Éowyn was the fifth named storm of the 2024/25 winter storm season.</p> <p>Storm Éowyn had many severe impacts in Ireland, which were especially severe and long-lasting in remote and rural areas, and unfortunately resulted in one fatality.</p> <p>Gale to storm-force winds were brought into Ireland as it was exposed to a “strong gale-force to hurricane-force cyclonic variable airflow”.</p> <p>Storm Éowyn occurred just seven weeks after Storm Darragh, which was the most historically significant storm up until Storm Éowyn (Department of Housing, Local Government and Heritage, 2025).</p>	Department of Housing, Local Government and Heritage (2025)
Date of occurrence for the event described in this survey	24 th -25 th January 2025.	
Geographical scale of occurrence for the event	National – red level wind warning for all counties.	
Type of hazard for the event	Extratropical cyclone (windstorm).	
Magnitude and length	<p>Éowyn joins the list of storms that have observed hurricane force 12 wind speeds on land in Ireland, such as the ‘Night of the Big Wind’ storm in January 1839 (estimated wind speeds of 100 knots), Debbie in September 1961 (gusts up to 181 km/h), and more recently Darwin in February 2014 (gusts up to 159 km/h). During Storm Éowyn, hurricane force 12 was reached in two wind observations stations, violent storm force 11 was reached in four stations, and storm force 10 was reached in eight stations (Met Éireann, 2025a).</p> <p>During Éowyn, Ireland observed record-breaking wind speeds in four wind observations stations ranging from 124 km/h – 184.3 km/h.</p> <p>The national wind speed records from Éowyn, which are still being verified, are:</p> <ul style="list-style-type: none"> • The highest sustained (10-minute mean wind speed) west-southwest hurricane force 142 km/h (76.5 knots or 88 mph) at Mace Head (coastal), Co Galway (which is an exposed coastal station with a record length of 21 years) in the hour ending 04 UTC on Friday 24 January 2025. • The highest gust (3-second mean wind speed) west-southwest 184 km/h (99.5 knots or 115 mph) at Mace Head (coastal), Co Galway at 04:40 UTC Friday 24 January 2025. <p>(Met Éireann, 2025b).</p> <p>The storm lasted two days.</p>	Met Éireann (2025a) Met Éireann (2025b)

Impact on population of the hazard	<p>Deaths: 1 fatality reported in Ireland.</p> <p>Storm Éowyn had many severe impacts in Ireland, which were especially severe and long-lasting in remote and rural areas.</p> <p>Water: Approximately 130,000 customers across 51,000 homes, businesses, and farms had no access to water during the peak of the storm. 11,500 customers were affected by the Boil Water Notices issued following the storm, caused by unsafe water supply (Department of Housing, Local Government and Heritage, 2025).</p> <p>Electricity: Large swathes of the country had power outages. At one stage nearly one million (14%) people on the island of Ireland were without power. 768,000 electricity customers were impacted (approximately 33% of all properties), affecting homes, businesses, and farms (ESB, 2025).</p> <ul style="list-style-type: none"> • Approximately 70% (533,000) of affected customers had their power restored within 72 hours of the storm. • 90% of affected customers had their power restored after 7 days. • It took 18 days to restore power to the remaining customers. • Over 1,800 critical infrastructure sites were prioritised, such as hospitals, water and wastewater facilities, air navigation sites, schools, etc. (ESB, 2025) 	<p>Electric Supply Board (2025)</p> <p>Department of Housing, Local Government and Heritage (2025)</p>
Which and how economic agents were primarily affected	<p>Overview: Households, companies, transport affected.</p> <p>Electricity: 768,000 electricity customers impacted (approximately 33% of all properties), affecting homes, businesses, and farms. Approximately 70% (533,000) of affected customers had their power restored within 72 hours of the storm. 90% of affected customers had their power restored after 7 days. It took 18 days to restore power to the remaining customers. Over 1,800 critical infrastructure sites were prioritised, such as hospitals, water and wastewater facilities, air navigation sites, schools, etc. (ESB, 2025).</p> <p>Water: At peak, c. 130,000 customers (51,000 premises) were without water; c. 750,000 customers (295,000 premises) were at risk.</p> <p>Internet and mobile service: At peak, approximately 280,000 users had no broadband or landline service, and more than 2 million mobile service users were affected, to the extent that their local coverage was either degraded or completely off air. Most services were restored by 2nd February (Department of Housing, Local Government and Heritage, 2025).</p> <p>Transport: All public transport services were suspended during the weather warning. There were further delays to the operation of public transport while fallen trees, power lines, and debris were removed from the transport corridors. The majority of transport routes were ready for use within 24 hours (Department of Housing, Local Government and Heritage, 2025).</p> <p>Households: Household and communities were affected the most. Households faced up to 72 hours without essential services. 270,000 homes were without internet access, with a two week period to restore internet to all customers (Dáil Eireann Deb, 2025b).</p> <p>Businesses: Businesses faced property damage, disruptions to operations, and loss of stock. They experienced loss of earnings, costs faced in response to the damage caused by the storm, disruptions to trading, and damage to the business property. Businesses and farms were not provided with humanitarian assistance (Dáil Eireann Deb, 2025b).</p>	<p>Communication Networks SAP (2025)</p> <p>Electric Supply Board (2025)</p>

Overview of how the economy in was affected, with a focus on most impacted sectors

Electricity (EirGrid & ESB Networks).

- Customers affected: 768,000 at peak (≈30% of customers).
- Transmission faults: 103.
- Network scale (ESB N): 160,000 km overhead, 28,000 km underground, 800 substations.
- Restoration: 70% restored within 72 hours; 90% within 1 week; all customers by 11 Feb (18 days total).
- 12,500 counts of damage to ESB's electrical system, mainly to the low and medium voltage system. However, more damage was caused to the higher voltage system than in previous storms.
- 4,900 calls were made by the public to report extreme danger.
- 4,000 staff including crews donated by several European utilities were required to restore electricity within Ireland (ESB, 2025).

Despite the cost of repairs undertaken by the ESB, the cost was not passed onto the consumer through higher electricity prices.

Energy Production: A wind turbine in Indreabhán in Co. Galway was damaged by the storm (Met Eireann, 2025b).

Gas: Supply continuity: No gas supply interruption; 10 sites lost both primary & backup telemetry channels due to telecoms/power issues.

Drinking Water & Wastewater (Uisce Éireann):

- At peak: 130,000 customers (51,000 premises) without water; 750,000 customers (295,000 premises) at risk.
- Assets impacted: 286 Water Treatment Plants; 293 Wastewater Treatment Plants.
- Maintained via generators: supply preserved to 146,000 premises (395,000 customers).

(Department of Housing, Local Government and Heritage, 2025).

Communications Infrastructure (Fixed & Mobile; ECAS 999/112):

- Fixed services: 281,000 users without connection at peak; damage to > 6,000 poles and >1,500 km of fibre/copper. Most fixed services restored by 2 Feb; < 0.1% out by 19 Feb.
- Mobile services: up to ~2,052,100 users with degraded/interruptions; 6 masts structurally damaged out of ~8,300. Most users restored by 7 Feb; all by 11 Feb.

Department of Finance

[Coillte](#) (2025, May 2)

[Electric Supply Board](#) (2025)

[Department of Housing, Local Government and Heritage](#) (2025)
Review of Storm Éowyn

[Irish Farmers' Association](#) (IFA) (2025, January 27)

[Met Eireann](#) (2025b)

[O'Halloran, B.](#) (2025, February 22)
The Irish Times

[Riegel, R.](#) (2025, February 17)

[Teagasc \(Host\).](#) (2025, March 3)
[Audio podcast episode No. 98]
In The Environment Edge

Overview of how the economy was affected, with a focus on most impacted sectors

Transport: Aircraft that would usually travel through the North Oceanic Transition Area (NOTA) were forced to fly through less efficient routes following the closer of NOTA airspace for 24 hours due to disruptions to telecommunications and the shutdown of radars during periods where wind speeds surpassed maximum allowable thresholds. This affected the fuel usage and arrival times of the aircraft that were rerouted (Department of Housing, Local Government and Heritage, 2025).

Horticulture: The horticulture sector suffered severe losses due to the damage of early crops, polytunnels, and greenhouses (Department of Housing, Local Government and Heritage, 2025).

- The horticulture sector is worth nearly €600 m of the Irish economy (IFA, 2025).
- The Irish Farmers' Association, Organic Growers of Ireland, and Teagasc estimate that the horticulture sector suffered a €4.5 m loss due to damage to greenhouse and polytunnels, as well as the loss of early crops to the storm (Riegel, 2025).
- This loss amounts to 0.75% of the sectors' annual worth.

Forestry:

- Approximately 26,000 hectares of estimated forestry damage (Coillte, 2025) (approx. 3% of total planted forestry), amounting to 10 m cubic meters of timber, which is 2.5-3 times more than the annual harvest per year. This is divided equally between private and public forestry (Teagasc, 2025).
- It is estimated that there was €500 m in damages to forests as a result of the storm (O'Halloran, 2025).
- This has affected pensions and retirement plans.
- Coillte, Ireland's semi-state forestry company, estimated financial losses greater than €60 m, which included managing the windblown material, harvesting, haulage, and clean-up costs. 14,500 of the forests damaged by the storm are managed by Coillte. Coillte had paid €2.9 m in dividends to the State in 2024. 2025 figures may be impacted by the losses endured following the storm (Coillte, 2025).

Meat Processing: Operations at several abattoirs across the country were disrupted by power and internet outages, impacting animal processing, and temporary delays in the traceability and certification process (Department of Housing, Local Government and Heritage, 2025).

Emergency Services:

- Health Care:

There was some disruption to the HSE's (Ireland's national healthcare organization) outpatient services for a period during the Red Weather Warning on the 24th January. The provision of care was not disrupted due to the generator backup supply.

Community and primary care services were impacted by the disruptions to water supply and access to digital infrastructure.

One regional hospital was at risk of completely losing water supply. The hospital worked closely with Uisce Eireann and ESB Network to prioritize the restoration of the water supply and power, while the Fire Services were engaged to refill the hospital's water tanks while the supply was restored.

A few smaller units, such as community residential houses, administration blocks, and ambulance stations did not have power for several days.

The ambulance service experienced disruptions to TETRA during and after the storm, with pockets of coverage outages in certain regions (Department of Housing, Local Government and Heritage, 2025).

Overview of how the economy in was affected, with a focus on most impacted sectors	<ul style="list-style-type: none"> • Fire Services: Some fire stations lost all voice communications and mobilisation capacity due to the loss of service of the Public Switch Telephone Network, the Mobile Network, and TETRA network (Department of Housing, Local Government and Heritage, 2025). • Irish Coast Guard: The West Coast experienced interruptions to the distress radio coverage. Calls for 112 phones in Malin and Valentia had to be diverted to Dublin, resulting in a lack of a distress watch on the northwest coast. The three Coast Guard Control rooms were affected by the partial loss of service in the TETRA system (Department of Housing, Local Government and Heritage, 2025). 	
Any other key characteristic deemed relevant	Schools were closed during the Red Weather Warning and many lost power due to the storm. 302 schools were escalated by the ESB as a high priority for the restoration of power so that they may reopen by the 4 th February.	Electric Supply Board (2025)

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	
	Inflation rate (in pp)	
	Unemployment rate (in pp)	
	Total import & export (gross or in %)	
	Others	
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	

Quantitative estimates of the natural hazard's impact	Insured and uninsured losses, in volume and in % of total losses	<ul style="list-style-type: none"> • Total Gross Incurred Claims (€): €343,452,594. <p>Insurance Ireland note that this is the most expensive insurance event related to storms in Irish history. Households made most of the claims, but commercial/business costs were higher.</p> <p>Households:</p> <ul style="list-style-type: none"> • 67% of claims were for damage to households. • Average claim of €5,745 per household. • These claims amounted to €129,437,579. <p>Businesses:</p> <ul style="list-style-type: none"> • 29% of claimes were related by businesses. • Average claim of €17,000. • 55% (€165,610,216) of the overall cost of the storm was accounted for by businesses. <p>Motor:</p> <ul style="list-style-type: none"> • 4.4% or 1,513 claims were submitted for vehicles. • Claims amounted to €6,216,663 m. <p>(Insurance Ireland, 2025).</p>	<u>Department of Finance Insurance Ireland (2025)</u>
	Other relevant variables	<ul style="list-style-type: none"> • Waterways Ireland (WI): €405,000 of its financial budget used to cover costs of repairs. • The National Parks and Nature Reserves Directorate within the National Parks and Wildlife Service consider €1 million a reasonable estimate of the impact of the storm on their costs. • €18,600,279 was paid in 2025 to Local Authorities for unbudgeted costs related to the four weather events (Storm Amy, Storm Bert and the snow event in January 2025). • In response to the extensive damage of Storm Éowyn to water infrastructure nationally and widespread power outages; Uisce Éireann deployed emergency crews day and night to provide water and treat wastewater using interim solutions, complete critical repairs work and restore supply. • Total cost: €3.2 million: <ul style="list-style-type: none"> – €2.5 million relating to goods & services (generators, alternative water supplies, tankers, repairs & maintenance, etc.). – €0.7 million to cover the overtime incurred. • Uisce Éireann's total costs are estimated inc. €5.3 million. 	<u>Department of Housing, Local Government and Heritage (2025)</u> Department of Public Expenditure, Infrastructure, Public Service Reform and Digitalisation
Contagion and international spillover effects observed following the event			

Public measures taken to mitigate the impact of the disaster or boost the economic recovery

Immediate Response: Emergency Response Hubs were set up to provide those affected with basic needs e.g. water, hot food, shower facilities, phone charging and broadband access.

Department of Social Protection Humanitarian Assistance Scheme (to 9 Apr 2025):

- 80,000+ claims were registered.
- c. 34,000 awards.
- c. €8.2 million paid.
- Average €224.03 per award accepted until 24 Apr 2025.

The Department of Social Protection manages the Humanitarian Assistance Scheme (HAS) to assist households and families that have been affected by severe weather events. The HAS has been activated 16 times in 2024 and 2025 due to severe weather events.

There are three stages to the HAS:

- First stage: provides immediate assistance to people who are impacted by the storm, helping them with access to essentials, such as food, water, warmth, and shelter. This stage does not have income limits applied.
- Second stage: Replaces white goods, basic furniture, and other essential household items that have been damaged by severe weather.
- Third stage: Provides aid to help make the household property habitable again, providing funding for reconstruction work such as plastering, dry lining, electrical rewiring, etc.

The second and third stage have income limits of €50,000 for a single person, €90,000 for a couple, and €15,000 per dependent child.

The department provides a loss adjuster to assess the quoted costs of repair and to advise the department on the required amount to make the property habitable following the weather event. Possible measures to protect the property against future risks are also considered (Department of Housing, Local Government and Heritage, 2025).

Scheme of Investment Aid for the Development of the Commercial Horticulture Sector:

This scheme was reopened following the storm to help growers who were seeking to invest in response to damage caused by the storm. The Scheme considered new materials, and new specialised horticulture plant or equipment structures (e.g. polythene covers for tunnels). The goal was to provide support so as to relieve the greatest impact to the horticulture sector (Department of Housing, Local Government and Heritage, 2025).

Department of Agriculture, Food and the Marine
(2025, December 10)

Department of Housing, Local Government and Heritage (2025)

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>Targeted Agricultural Modernisation Scheme (TAMS 3):</p> <p>TAMS 3 was made available to provide aid to farmers for PTO backup generators, fencing for farm animals, wood chippers, and mulchers. New installations were supported by the scheme, and it supported investment in equipment that restores power quickly so as to make farmers more resilient to future weather events. Farmers could apply for grant aid to take down and rebuild farm buildings that were damaged by the storm. Grant aid was also announced to replace roofs damaged during the storm (Department of Housing, Local Government and Heritage, 2025).</p> <p>Forest Windblow Taskforce (FWT) and Reconstitution Scheme for private forest owners:</p> <p>This taskforce was made up of forest owners, forest companies, sawmillers, Teagasc, Coillte, and other stakeholders. Their main responsibility was to deal safely with with forestry that had been damaged during the storm, including prioritising the provision of felling licences for windblown trees, and examining issues that arose due to harvesting (Department of Housing, Local Government and Heritage, 2025). Private forest owners can apply for grant aid, with up to €55 million being available to owners affected by Storm Darragh and Storm Éowyn under the Reconstitution Scheme. Aid will be provided for replanting to help restore forests. The amount of aid provided for windblow is affected by whether the forest had insurance for the costs of reconstitution at the time of the two storms. The grant will be paid in two insallments : 75% will be provided in the year that the replanting takes place, and 25% in four years. The rates differ based on the forestry type. Supports are also available to help landowners build resilience through the establishment of new forests (Department of Agriculture, Food and the Marine, 2025).</p>
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Other comments

3. FINANCIAL DISRUPTION

Impacts on the banking sector		
Impacts on the insurance sector	<p>Total Reported Insurance Claims Count: 36,758.</p> <p>Total Gross Incurred Claims (€): €343,452,594.</p> <p>67% of the claims submitted by households, 29% by businesses, and approximately 4.5% were motor claims (Insurance Ireland, 2025).</p> <p>There was a 0.2% increase in the price of home insurance in February 2025 compared to January 2025, and it was 7.5% higher in 2025 relative to 2024. Although the cost of claims may be a strong contributor to the increase in house premiums, the increases cannot be directly attributed to the increase in claims due to Storm Éowyn. The premiums are sensitive to inflationary pressures: higher cost of materials, energy, and labour lead to higher costs of rebuilding (Dáil Éireann Deb, 2025a).</p> <p>Historically, approximately 15% of losses caused by extreme weather and climate events have been insured in Ireland between 1980-2023 (Gagliardi, 2022).</p>	<p>House of the Oireachtas (2025a, April 8)</p> <p>Insurance Ireland (2025)</p> <p>Gagliardi, N. (2022)</p>
Impacts on financial markets, at local or global scale		

Impacts on public finances	<ul style="list-style-type: none"> • Waterways Ireland (WI) used €405,000 of its financial budget to cover costs of repairs. • The National Parks and Nature Reserves Directorate within the National Parks and Wildlife Service consider €1 million a reasonable estimate of the impact of the storm on their costs. • A total of €18,600,279 was paid in 2025 to Local Authorities for unbudgeted costs related to the four weather events (Storm Amy, Storm Bert and the snow event in January 2025). • In response to the extensive damage of Storm Éowyn to water infrastructure nationally and widespread power outages; Uisce Éireann deployed emergency crews day and night to provide water and treat wastewater using interim solutions, complete critical repairs work and restore supply. The total cost of this was €3.2 million, with €2.5 million relating to goods & services (generators, alternative water supplies, tankers, repairs & maintenance, etc.) and €0.7 million to cover the overtime incurred. • Uisce Éireann's total costs are estimated inc. €5.3 million. 	Department of Finance
Other comments		

16. Flood in Italy (2023)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	The event consisted of severe hydro-meteorological episodes characterized by unprecedented rainfall that led to extensive fluvial flooding and thousands of landslides.	
Date of occurrence for the event described in this survey	Two primary intense rainfall episodes occurred: the first in early May (May 1-3) and a second, more extensive event in mid-May (May 16-17), 2023.	
Geographical scale of occurrence for the event	Regional/Local. The impact was concentrated in the Romagna area (ITALY) (the southeastern part of the Emilia-Romagna Region) and the provinces of Bologna, Ravenna, Forli-Cesena, and Rimini.	
Type of hazard for the event	Fluvial floods, flash floods, and landslides.	
Magnitude and length	Record-breaking precipitation reached 200-300 mm within 48 hours in several areas. The combined effect of these two events exceeded a 500-year return period.	Berti et al. (2025) Valente et al. (2025)
Impact on population of the hazard	The disaster resulted in 17 deaths and the displacement of approximately 36,600 people. The affected area is home to approximately one million residents.	Palazzoli et al. (2026) Berti et al. (2025)
Which and how economic agents were primarily affected	Households: Suffered from flooded homes, loss of vehicles, and psychological distress. Companies: Experienced infrastructure damage, disrupted utilities, and service interruptions. Farmers: Faced massive crop loss and long-term orchard damage.	Cremonini et al. (2024) Valente et al. (2025) Berti et al. (2025)
Overview of how the economy in was affected, with a focus on most impacted sectors	Agriculture was severely hit, particularly in the "Fruit Valley"; vegetable production dropped by 17%, and many orchards require total replacement. In terms of infrastructure: extensive damage to over 700 roads, major motorways, and the railway network. In terms of real estate: temporary drop in housing demand (visits/requests down by 20-26%), though asking prices remained stable.	Banca d'Italia (2025) Cremonini et al. (2024) Valente et al. (2023)
Any other key characteristic deemed relevant	The flooding was exacerbated by soil saturation from previous events and drought conditions that had reduced the soil's storage capacity. Over 80,000 landslides were mapped in the aftermath.	Berti et al. (2025) Cremonini et al. (2024)

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	The reduction in regional GDP growth for 2023 is estimated between 0.1% and 0.2% (excluding the agricultural sector), translating to a loss of between €3 and €5 million according to certain source estimates.	Banca d'Italia (2025)
	Inflation rate (in pp)	Generally, in Italy, heavy rainfall is associated with a general decline in inflation, largely due to marked reductions in energy prices.	Banca d'Italia (2025)
	Unemployment rate (in pp)	Hiring in the agricultural sector fell by 48% during the flood period but recovered within six weeks.	Banca d'Italia (2025)
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	Sectoral Production: Agricultural Gross Marketable Production saw a total economic reduction of -9% in 2023.	Cremonini et al. (2024)
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses	Insured and uninsured Losses: total damages are estimated between €8.8 billion and €10 billion. A significant insurance protection gap exists, meaning the industry will likely cover only a small portion of these costs.	Cremonini et al. (2024) Banca d'Italia (2025)
	Other relevant variables		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	A 12-month state of emergency was declared, triggering national and EU Civil Protection mechanisms. Measures included compensation schemes, tax/payment suspensions, and the deployment of over 7,000 rescuers.		Valente et al. (2025) Valente et al. (2023) Berti et al. (2025)
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	The sector faces challenges due to the low prevalence of flood coverage among private entities and farms.	Cremonini et al. (2024)
Impacts on the insurance sector		
Impacts on financial markets, at local or global scale		
Impacts on public finances	Significant public investment is required for reconstruction, which may impact deficits and increase regional/national borrowing needs for long-term recovery.	Cremonini et al. (2024) Berti et al. (2025)
Other comments		

17. Hurricane in Jamaica (2025)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Hurricane Melissa made landfall in the parish of Westmoreland, Jamaica on 28 October 2025. This was the most severe storm to make landfall in Jamaica and principally tracked across the parishes of Westmoreland and St. James. The damage and losses caused by Hurricane Melissa was estimated at US\$12.2 bn, approximately 56.7 per cent of Jamaica's 2024 GDP. The damage is expected to result in a contraction in GDP over the December 2025 to September 2026 quarters. All industries were impacted, in particular, Agriculture, Forestry & Fishing, Accommodation & Food Service Activities, Electricity, Water Supply & Waste Management and Manufacturing.	UN Economic Commission for Latin America and the Caribbean JIS News Planning Institute of Jamaica (PIOJ)
Date of occurrence for the event described in this survey	28 October 2025.	
Geographical scale of occurrence for the event	The western and central parishes of St. Elizabeth, St. James, Westmoreland, Trelawny, Manchester, St. Ann, and Hanover were the worst hit parts of the country. St. Elizabeth was the most impacted parish due to the significant damage caused by extreme wind speeds, storm surge, and flooding.	Global Rapid Post-Disaster Damage Estimation (GRADE) Report, November 15, 2025
Type of hazard for the event	Category 5 Hurricane.	
Magnitude and length	Hurricane Melissa made landfall in Jamaica with sustained winds of 185 mph and a central pressure of 892 mb. The system affected Jamaica for approximately 24-48 hours, including the passage of outer rainbands before and after the storm's closest approach.	Jamaica Meteorological Service (MSJ)
Impact on population of the hazard	<p>Hurricane Melissa caused severe damage across six most-affected parishes, namely Westmoreland, St. Elizabeth, St. James, St. Ann, Trelawny, and Manchester. 45 persons are estimated to have died due to the passage of the Hurricane.</p> <p>Many residents in these parishes lost their roofs while others sustained structural damage to their houses, furnishings and clothing, leaving some with a lack of shelter. The International Organization for Migration (IOM) reported that around 120,000 residential dwellings require repair or reconstruction (IOM, 2025a).</p> <p>The most severely affected areas included: St. Elizabeth (56 percent of dwellings damaged or destroyed, over 30,000 homes), Westmoreland (48 percent, nearly 26,000 homes), St. James (33 percent, over 23,000 homes), Trelawny (29 percent, almost 9,000 homes), Hanover (27 percent, 7,000 homes), Manchester (26 percent, 11,500 homes), and St Ann (24 percent, 15,000 homes).</p> <p>Five (5) hospitals and schools (446 accounting for ~150k students) sustained major damage (disrupted). 70.0 per cent of hotel room stock was affected, as well as 151 roads.</p> <p>Flooding and lack of access to various areas meant that some persons were cut-off from Urban centres for days. Some persons lost their livelihood due to damage to commercial property and loss of goods. Others were laid-off as many damaged hotels were closed for refurbishing. There was a lack of electricity and potable water due to damage to JPS grid and water pumps.</p>	Global Rapid Post-Disaster Damage Estimation (GRADE) Report, November 15, 2025
Which and how economic agents were primarily affected	All economic agents were affected. Housing, tourism, education, health, agriculture, energy, transport, telecommunications, and other economic and social infrastructure were significantly affected.	JIS News Planning Institute of Jamaica (PIOJ)

Overview of how the economy was affected, with a focus on most impacted sectors	<p>Real GDP is projected to contract within the range of -11.5 per cent to -0.5 per cent over the four quarters (December 2025 to September 2026) following the passage of Hurricane Melissa.</p> <p>The most impacted industries were Agriculture, Forestry & Fishing and Accommodation & Food Service Activities and its allied industries, Electricity, Water Supply & Waste Management and Manufacturing. For Agriculture, Forestry & Fishing, declines are estimated in domestic crops, livestock as well as fisheries. Domestic crop production declined by 25.7 per cent in the December 2025 quarter in 10 of the 14 parishes. Accommodation & Food Service Activities and its allied services, are anticipated to contract in the December 2025 quarter. Visitor arrivals declined by 39.1% in the December 2025 quarter and is projected to contract year over year between the March 2026 and the September 2026 quarter. The contraction is predicated on lower foreign national arrivals due to damaged rooms and an update to the US travel advisory immediately following the adverse impact of the hurricane.</p> <p>Electricity, Water Supply & Waste Management is anticipated to decline reflecting widespread power outages that also affected water distribution, particularly in November and December 2025. Electricity consumption declined by 16.2 per cent in the December 2025 quarter. 90.0 per cent of customers were restored (with electricity service) by end December 2025.</p> <p>With regard to Manufacturing, the anticipated contraction is underpinned by the hurricane's significant impact on the Food, Beverages & Tobacco sub-industry as major food processing facilities, agro-progressing plants and key distribution centres, particularly in the western region sustained extensive damage.</p>	BOJ projections Statistical Institute of Jamaica (STATIN) outturn
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Any other key characteristic deemed relevant

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	Real GDP is projected to contract within the range of -11.5 per cent to -0.5 per cent over the four quarters (December 2025 to September 2026) following the passage of Hurricane Melissa.	JIS News PIOJ on the DALA Report for Hurricane Melissa
	Inflation rate (in pp)	Annual point-to-point headline inflation rate at December 2025 accelerated to 4.5 per cent from 2.1 per cent at September 2025. Similarly, core inflation (CPIAF) at December 2025 was higher relative to September 2025. The headline inflation outturn primarily reflected an acceleration in agricultural inflation due to the impact of Hurricane Melissa on agricultural supplies.	STATIN outturn BOJ Forecast February 2026
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others	The public debt is anticipated to deteriorate given the passage of Hurricane Melissa. The fiscal rules embedded in Jamaica's Fiscal Responsibility Legislation were temporarily suspended in December 2025 for a period up to end-March 2027. The debt-to-GDP ratio is projected to be higher by 5.2 pps at end-FY 2025/26 relative to the GOJ's estimate of 63.7 per cent for end-FY 2025/26.	Government of Jamaica, 2nd December 2025 Government of Jamaica, 12th February 2026

Quantitative estimates of the natural hazard's impact	<p>Sectoral GVA for impacted sectors</p> <p>Sectoral production for impacted sectors</p> <p>Food price index</p> <p>Insured and uninsured losses, in volume and in % of total losses</p> <p>Other relevant variables</p>	<p>Government of Jamaica, 12th February 2026</p> <p>Bank of Jamaica, annual report, 2025</p>
Contagion and international spillover effects observed following the event	There were pileups at the Ports in Kingston.	
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>The Jamaican Government's response to Hurricane Melissa included the provision of emergency food packages, setting up of field hospitals and the procurement of modified container homes. The GOJ's response also includes the recently launched Restoration of Owner or Occupant Family Shelter (ROOFS) Programme, where inhabitants of dwellings that lost roofs, are eligible for assistance. This programme is being managed by the Ministry of Labour and Social Security at a cost of \$10 bn. Additionally, fiscal support to the Development Bank of Jamaica's M5 Business Recovery Programme amounting to \$3 bn.</p> <p>A support package of \$100 million was established to aid banana and plantain farmers.</p> <p>Customs Relief: A waiver of import duty and General Consumption Tax (GCT) was applied to approved disaster relief items, including food, water, and building materials, certified by ODPEM. This expired on 31 December 2025.</p> <p>Recent reports indicate that the Government applied for a received US\$20 million from the Loss and Damage Fund at the UN.</p> <p>The Bank of Jamaica also implemented a range of monetary and prudential measures to support macrofinancial stability. The Bank's MPC held the policy interest rate steady. Liquidity conditions were actively managed to ensure that financial institutions had adequate access to funding, thereby facilitating the continued flow of credit to households and businesses. The Bank also intervened, as necessary, in the foreign exchange market to limit excessive volatility.</p> <p>On the prudential side, enhanced supervisory oversight helped to ensure that financial institutions maintained strong capital and liquidity buffers. Institutions were allowed to grant moratoria to their customers while they worked with them to ascertain the extent of the impact of the Hurricane on their viability. That process is ongoing.</p>	<p>Government of Jamaica, 12th February 2026</p> <p>Bank of Jamaica, annual report, 2025</p>
Other comments		

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>The banking sector remained broadly resilient following the hurricane, supported by strong capital buffers and adequate liquidity positions. More specifically, the banking system continued to meet prudential capital and liquidity requirements, and financial intermediation continued without major disruptions. The sector is expected to remain robust, supported by strong regulatory oversight as well as adequate capital buffers and liquidity coverage.</p>	Bank of Jamaica, annual report, 2025
Impacts on the insurance sector	<p>The insurance sector played a critical role in absorbing part of the financial losses associated with Hurricane Melissa through claims payments for damage to residential, commercial, and tourism-related assets.</p> <p>Jamaica's insurance industry is relatively concentrated, with 17 registered life and general insurance companies operating in the market. Additionally, Jamaica's insurance industry had experienced strong balance-sheet growth prior to the hurricane, with total sector assets reaching approximately J\$614.6 billion by September 2025, suggesting that the sector entered the shock from a position of relative financial strength.</p> <p>Early catastrophe modelling estimates suggested that insured losses in Jamaica could reach between US\$2.2 billion and US\$4.2 billion, reflecting widespread wind and flood damage across the island.</p> <p>Although claims activity increased significantly following the event, the structure of Jamaica's insurance market – characterised by extensive use of international reinsurance and catastrophe risk transfer mechanisms – means that a large share of the financial losses is expected to be borne by global reinsurers rather than domestic insurers.</p> <p>At end-2025, total expected recovery from reinsurers amount to US\$703.6 million (≈ J\$111.2 billion). The remaining losses are highly concentrated, with the top five general insurers accounting for approximately 82.5% of expected insurable losses).</p> <p>In addition to traditional insurance claims, parametric disaster insurance mechanisms provided rapid financial support to the Government of Jamaica providing immediate liquidity for disaster response and recovery efforts. ccrif.org.</p>	Bank of Jamaica, Financial stability report, 2025
Impacts on financial markets, at local or global scale	<p>The hurricane generated short-term pressures in domestic financial markets, particularly in the foreign exchange market.</p> <p>Following the passage of Hurricane Melissa, the Bank introduced special pre-emptive measures to preserve relative stability in the foreign exchange market. These measures took into consideration the extraordinary demand for foreign exchange to finance increased imports made necessary by the rehabilitation and reconstruction efforts. Consequently, the Bank sold US\$250 million into the market for the period November to December 2025. Additionally, selected players in the energy sector were directly supplied with foreign exchange to remove large purchases from the market. The Bank also re-introduced scheduled advanced notices of intervention sales in order to assure the market of adequate foreign currency liquidity. As such, these actions aided in contributing to relative stability in the foreign exchange market with the Jamaica Dollar depreciating on an annual average basis by 1.7 per cent against the US dollar compared to 1.4 per cent for 2024.</p> <p>As it relates to stock market performance, the domestic equities market contracted during the December 2025 quarter relative to the previous quarter. The declines in the major Jamaica Stock Exchange indices ranged between 0.8 per cent and 4.3 per cent compared to expansions between 1.2 per cent and 6.5 per cent for the previous quarter. The weakened performance during the December 2025 quarter partly reflects the impact of Hurricane Melissa in October 2025, which represented an early quarter shock and likely heightened investor caution.</p> <p>After the hurricane, S&P and Fitch revised Jamaica's outlooks to stable, citing uncertainty about recovery, pressure on debt dynamics, and exposure of tourism, agriculture, and mining. Moody's still upgraded Jamaica, but also moved the outlook to stable and explicitly referenced climate and external vulnerability.</p>	Bank of Jamaica, annual report, 2025

Impacts on public finances

Public finances were affected through both revenue weakness and higher recovery spending. More specifically, government revenues were affected in the short term due to weaker economic activity in sectors such as tourism, agriculture, and commerce. At the same time, public expenditure increased significantly to support disaster response, social assistance, infrastructure repair, and reconstruction efforts. To facilitate recovery spending, fiscal policy was temporarily adjusted, allowing for higher government expenditure related to disaster management and rebuilding activities.

[Bank of Jamaica, annual report, 2025](#)

Disaster risk financing instruments provided an important source of funding for the recovery effort. In particular, insurance payouts triggered by Hurricane Melissa included US\$156 million from the World Bank catastrophe bond and US\$91 million from CCRIF. These payouts supported the government's fiscal response and helped reduce the need for additional borrowing in the immediate aftermath of the hurricane.

In summary, the fiscal impact reflected a temporary deterioration in the fiscal path.

Other comments

18. Typhoon in Japan (2018)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Typhoon Jebi in 2018 caused widespread damage across Japan, primarily impacting the Kansai region, the country's second-largest economic hub. According to the statistics from the General Insurance Association of Japan, it caused record-high insurance payout for a natural disaster (excluding earthquakes), amounting to 1.07 trillion yen.	Japan's Cabinet office (2019) The General Insurance Association of Japan (2021)
Date of occurrence for the event describe in this survey	The typhoon made landfalled on September 4 – September 5, 2018. The typhoon occurred around Marshall Islands in August 28, 2018 and approached to Japan.	Japan's Cabinet office (2019)
Geographical scale of occurrence for the event	National (especially Osaka prefecture was severely affected).	Japan's Cabinet office (2019)
Type of hazard for the event	Typhoon, which caused storm surge, high waves and heavy rain.	Japan's Cabinet office (2019)
Magnitude and length	From September 4 to September 5, high wind, storm surges, and heavy rains were observed. High Wind: More than 50 locations nationwide recorded their highest wind speeds ever. Notably, Kansai International Airport in Osaka registered a peak wind speed of 58.1 m/s. Storm Surge: A storm surge of 329 cm was recorded in Osaka Prefecture, which was well above the previous record of 293 cm in 1961. Heavy Rain: Hourly precipitation of 69.0 mm was recorded in Nose, Osaka Prefecture.	Japan's Cabinet office (2019)
Impact on population of the hazard	The typhoon caused 14 fatalities and 46 seriously injured across the country. More than 80,000 houses in the Kinki region and other areas were damaged. Osaka Prefecture suffered the worst damage, where approximately 65,000 houses were damaged.	Japan's Cabinet office (2019)
Which and how economic agents were primarily affected	Households: Approximately 1.7 million households in the Kansai Electric Power service area experienced power outages. While 98% of the households recovered by September 9, it took two weeks for full restoration. Transportation: Kansai International Airport, Japan's third busiest by passenger volume, was forced to suspend operations, and it took about two weeks to fully resume services. Financial Services: Due to power outages, 6 branches from 5 financial institutions had to temporarily close.	Japan's Cabinet office (2019)
Overview of how the economy in was affected, with a focus on most impacted sectors	Tourism: The number of monthly passengers at Kansai International Airport in September 2018 fell by 48% year-on-year. The annual passengers increased by 3%. Trade: The total value of monthly imports and exports in the Kinki region respectively fell by approximately 25% year-on-year in September. The annual imports and export in the area increased by 2.3% and decreased -0.1% respectively. Agriculture, Forestry, and Fisheries: Relevant facilities across Japan were damaged, with losses amounting to 46.8 billion yen, primarily due to the destruction of agricultural crops and greenhouses.	Japan's Cabinet Office (2019) Kansai International Airport n.d. Osaka Customs Office n.d. Ministry of Agriculture, Forestry and Fisheries (2018)
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	N.A.	
	Inflation rate (in pp)	N.A.	
	Unemployment rate (in pp)	N.A.	
	Total import & export (gross or in %)	N.A.	
	Others	<p>In the fiscal year 2022, a total of 54.833 billion yen was allocated for disaster recovery projects related to Typhoon Jebi, while 91.931 billion yen was set aside for erosion control and mitigation projects aimed at disaster prevention and reduction (including projects addressing other disasters and erosion control efforts in BAU).</p> <p>Note: Japan's disaster prevention budget is significantly large among the OECD countries, reflecting substantial expenditures not only for disaster reconstruction but also for disaster prevention and land preservation in BAU.</p>	<p>Japan's Cabinet Office (2024)</p> <p>OECD (2018)</p>
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	N.A.	
	Sectoral production for impacted sectors	N.A.	
	Food price index	N.A.	
	Insured and uninsured losses, in volume and in % of total losses	It caused record-high insurance payout for a natural disaster (excluding earthquakes), amounting to 1.07 trillion yen.	The General Insurance Association of Japan (2021)
	Other relevant variables		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery			
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	No significant increase in NPL and credit losses for the banks lending households and firms in the regions. BoJ staff reported that flood and typhoon generally tend to increase credit losses and NPLs in statistically significant but economically marginal scale (less than 10 bps per total lending amount).	Hiroki Yamamoto & Tomomi Naka (2021) Ashizawa et al. (2022)
Impacts on the insurance sector	While insured loss of this case was highest in GIAJ's statistics, it did not directly trigger a large-scale increase in the fire insurance reference pure premium (*) calculated by the General Insurance Rating Organization of Japan. (*) In Japan, it is common for fire insurance to be comprehensive, covering not only fire damage but also losses caused by natural disasters such as wind, hail, snow, water damage and water leakage.	The General Insurance Association of Japan (2021)
Impacts on financial markets, at local or global scale	N.A.	
Impacts on public finances	For the post-disaster recovery and compensation, Japanese government makes continuous public investment every year. As mentioned in the OECD review, the investment is at the outstanding level (roughly double) compared to other OECD member countries. Consequently, we have observed no significant impact on public finance uniquely caused by this event.	Japan's Cabinet Office (2025) OECD (2025)
Other comments		

19. Drought in Morocco (2016)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

This case study includes results from a Bank Al-Maghrib study on climate risks, which extrapolates past climatic trends to produce forward-looking projections, as well as findings from the probabilistic evaluation of disaster risks in Morocco conducted by the World Bank jointly with the Moroccan government. Unlike other case studies, it therefore does not rely solely on past evidence. As a result, the use of this case study in the note has been limited.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	<p>Drought: Prolonged drought with RP 500 extending over three years at the national scale starting in Q3 2020. Annual rainfall of less than 200 mm, with smaller farmers primarily affected, increased crop imports and led to a revenue decrease for the Agri-food industry.</p> <p>The scenario assumes a prolonged drought of a similar scale to the 2015/16 drought affecting Morocco but extending over three years.</p> <p>Flood: Two scenarios, riverine and a pluvial flooding corresponding to the 1-in-500-year local flood depth nationwide, hitting Morocco in Q3 2020. Flood duration of two days for pluvial, 30 days for riverine. Primarily affecting urban areas and leading to damages to buildings, contents, and machinery, as well as to the transportation network.</p>	
Date of occurrence for the event described in this survey	<p>Drought: Over three years at a national level, starting in Q3 of 2020.</p> <p>Pluvial Flood: Q3 2020 – 2 days.</p> <p>Riverine Flood: Q3 2020 – 30 days.</p>	
Geographical scale of occurrence for the event	<p>Drought: national.</p> <p>Flood: Local.</p>	
Type of hazard for the event	<p>Drought.</p> <p>Flood.</p>	
Magnitude and length	<p>Three years drought:</p> <ul style="list-style-type: none"> • Three consecutive years of drought, similar in magnitude to 2015/16 drought; that is rainfall below 200 mm over the growing season. <p>Two days flood event.</p>	
Impact on population of the hazard		

Which and how economic agents were primarily affected	<p>Drought:</p> <p>Small-scale farmers most affected.</p> <p>Increased crop imports.</p> <p>Revenue decline in the agri-food sector:</p> <ul style="list-style-type: none"> • Water availability is impacted in years two and three as stored water resources begin to be exhausted. • Overall national-level wheat production falls to below 3 million tons for three years (roughly equivalent to the 2015/16 drought). Morocco's wheat production plummeted to 2.7 million tons in 2016, from 8.1 million tons in 2015, the country's wheat imports doubled to 6.3 million tons in 2016, from 3.2 million tons in 2015. • Rural small-scale farms are heavily affected from year one (these represent around 50 percent of the total output). Cereal and livestock production drops significantly. • Larger-scale farms are not immediately impacted, but by year three yields decline significantly due to lack of water availability for irrigation. • Agri-business similarly sees declines in revenues in year three. <p>Flood:</p> <p>Primarily affecting urban areas and leading to damages to buildings, contents, and machinery, as well as to the transportation network.</p>
Overview of how the economy in was affected, with a focus on most impacted sectors	<p>Drought: agriculture. Agriculture remains a key sector for Morocco's economy, accounting for approximately 13 percent of Morocco's GDP, 23 percent of its exports, and nearly to 40 percent of its total employment. Rainfall shocks account for nearly 37% of the variance in GDP over the medium term, even though agriculture accounts for only 13% of GDP.</p> <p>Flood: agriculture, Industry and services.</p>
Any other key characteristic deemed relevant	

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	<p>According to the probabilistic evaluation of disaster risks in Morocco led by the World Bank, the country has an annual average direct financial loss from natural catastrophes of over US\$ 800 million. Morocco is regularly prone to flooding, with an estimate of over US\$ 400 million in direct financial losses each year.</p> <p>The country also has a typical temperate Mediterranean climate, but with dry conditions in much of the country: droughts affect the agricultural sector, with an estimated annual loss of crop yields of approximately US\$300 million.</p> <p>For example, the most recent severe drought in 2015-16 caused a three percent decline in economic growth¹. The earlier 1994/5 drought caused agricultural GDP to decline by 45 percent and national GDP to decline by 8 percent.</p> <p>The extrapolation of past climatic trends reveals a 1.8% loss in the GDP for the prolonged drought scenario and 1.5% loss in the GDP for the flood scenario.</p>
	Inflation rate (in pp)	
	Unemployment rate (in pp)	10.9% loss of employment rate (absolute).
	Total import & export (gross or in %)	
	Others	loss in Public Deficit of 4.14% GDP.
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	
	Insured and uninsured losses, in volume and in % of total losses	
	Other relevant variables	
Contagion and international spillover effects observed following the event		

Public measures taken to mitigate the impact of the disaster or boost the economic recovery

Other comments

Impacts on the banking sector

NPL (absolute): 10.5% for Agriculture, 8.5% for industry and services. **An increase of 2.1% of Banking sector NPL.**

PD (pp): 2.35% for agriculture.

CAR (percentage loss): 3.35%.

*** By the end of 5 years simulation period*.**

These figures represent the financial stress caused by the occurrence of a 1-in-500-year (RP 500) drought under historical **climate conditions** compared to a baseline scenario.

Impacts on the insurance sector

Impacts on financial markets, at local or global scale

Impacts on public finances

Other comments

20. Cyclone in Mauritius (2024)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Cyclone Belal, a very intense tropical cyclone, impacted Mauritius in January 2024. Although it did not make direct landfall (passing about 70 km to the south of the island), it caused severe flooding in the capital Port-Louis, alongside critical disruptions, including airport closure, power outages and evacuations. It also claimed the life of two persons, led to critical damages to infrastructure, with cars submerged under floodwaters or piled up on streets.	Cyclone Belal: Mauritius assesses damage after flash flooding Rétrospective : Un an après ce chaos nommé Belal
Date of occurrence for the event described in this survey	14-16 January 2024.	
Geographical scale of occurrence for the event	National – with the capital Port-Louis being the most affected and leading to closures of schools, offices and the port and airport.	
Type of hazard for the event	Cyclonic conditions and flooding.	
Magnitude and length	Cyclonic conditions for around 3 days with torrential rains and gusts exceeding 120 km/hour in many regions.	Hansard – Debate No 1 of 2024 – Tuesday, 26 March 2024 (Page 24)
Impact on population of the hazard	The cyclone and ensuing floods caused two deaths in Mauritius and affected around 100,000 people (around 8% of the population). Over 1,000 people were evacuated. Around 50,000 households experienced power outages.	https://gis.govmu.org/SitePages/ReadMore.aspx?IDR=3005
Which and how economic agents were primarily affected	<ul style="list-style-type: none"> Households were mainly impacted by the flooding, with damage to property and personal belongings as well as forced evacuations. Up to 50,000 households faced power outages for extended periods, which disrupted daily life such as communication and refrigeration. Corporates were affected by the curfew, which halted activities, especially in labour intensive sectors, thus causing a shortfall in revenue and production delays. The financial services sector was the least impacted during the passage of the cyclone as work-from-home arrangements implemented by numerous companies allowed the sector to continue operate despite cyclonic conditions. For the banking sector, online banking services enabled customers to conduct their transactions. However, insurance companies were significantly impacted by the insurance claims for vehicles that were damaged by floods. 	Coût économique du cyclone Belal : pertes de plusieurs milliards de roupies pour le pays Le Defi Media Group

Overview of how the economy in was affected, with a focus on most impacted sectors	<ul style="list-style-type: none"> • Although energy production remained unscathed by the passage of the cyclone, energy distribution was hindered due to damage caused to electricity lines. • The manufacturing sector was significantly impacted by the cyclone as manufacturing operators have export deadlines to meet and the forced closure of enterprises delayed the production process. These delays subsequently led to additional costs for businesses in terms of overtime payment to meet the delivery deadlines. • The tourism sector was affected by the temporary airport closure, which resulted in flight cancellations and rescheduling. In addition, tourists were confined in hotels for safety reasons during the passage of the cyclone, limiting activities and triggering revenue shortfall for operators reliant on excursions and outdoor activities. • For the agricultural sector, it was assessed that around 80% of crops were completely destroyed and 60% of vegetables ready for sale were affected. These were estimated to have led to losses amounting to around Rs 1.8 billion, which is equivalent to around US\$ 40 million. 	Coût économique du cyclone Belal : pertes de plusieurs milliards de roupies pour le pays Le Defi Media Group
Any other key characteristic deemed relevant	<ul style="list-style-type: none"> • Vehicles: Approximately 1,800 cars were damaged. • Disaster assistance: The Police issued 4,375 disaster assistance forms. 	Hansard – Debate No 1 of 2024 – Tuesday, 26 March 2024 (Pages 24 and 31)

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	The GDP impact, in terms of output loss due to the curfew without considering infrastructure damage, was estimated at around Rs 3 billion, equivalent to nearly US\$ 70 million.	Coût économique du cyclone Belal : pertes de plusieurs milliards de roupies pour le pays Le Defi Media Group
	Inflation rate (in pp)	Inflation rose by 2.3 pp, from 3.9% in December 2023 to 6.2% in February 2024, driven mainly by the rise in the prices of fresh vegetables.	
	Unemployment rate (in pp)	–	
	Total import & export (gross or in %)	–	
	Others	–	

Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	–	
	Sectoral production for impacted sectors	–	
	Food price index	–	Food inflation accelerated from 3.6% to 15.8% over the same period.
	Insured and uninsured losses, in volume and in % of total losses	–	
	Other relevant variables	–	
Contagion and international spillover effects observed following the event	–		
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<ol style="list-style-type: none"> 1. Comprehensive support package in response to Tropical Cyclone Belal, allocating a budget of around Rs 1 billion. 2. Financial Assistance: <ul style="list-style-type: none"> • Rs 2,000 one-off payment to households with power cuts exceeding 12 hours (some 50,000 families are concerned with this measure). Grants for planters, breeders, fishermen, and honey producers, ranging from Rs 5,000 to Rs 50,000 depending on type of loss. 3. Vehicle Support: Compensation for fully or partially damaged vehicles through the Financial Services Commission – the regulator for non-bank financial services sector and global business. 4. Loans: The Development Bank of Mauritius, a financial institution that provides financing and support for economic development projects, offered loans up to Rs 500,000 at 1% interest rate to affected planters, fishermen, breeders, and micro-enterprises. 5. Infrastructure Repair: Rs 500 million allocated for public infrastructure restoration. 6. Evacuation Centers: Cyclone allowance provided to all persons who spent the night in one of the 163 centres across the island and food allowance of Rs 250 per person for a maximum of three days. School materials and food packs were distributed to those who stayed in shelters. 		<p>Source: GIS Mauritius</p> <p>https://gis.govmu.org/SitePages/ReadMore.aspx?IDR=3005</p>
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>The Bank collects data annually on the incurred losses due to climate risk drivers. Some financial institutions have reported material impacts (impacts in excess of Rs 100,000) as well as non-material impacts following the Cyclone named Belal which had hit Mauritius in January 2024 and had caused severe flooding.</p> <p>Based on the information available, it cannot be inferred that cyclone Belal resulted in an increase in NPL In Mauritius.</p>	
Impacts on the insurance sector	<p>Climate-related financial risk is considered as a significant factor for the insurance industry. Severe flash floods associated with the cyclone Belal led to a notable increase of 25 per cent in gross claims payments, predominantly within the motor segment. Most of the heightened claims were absorbed by reinsurance but had the long-term consequences of increased reinsurance costs.</p> <p>The government responded by fully compensating affected policyholders up to the sum insured under comprehensive covers and compensate policyholders not having adequate insurance coverage such as third party and comprehensive without flood and cyclone cover.</p> <p>Overall, the Financial Services Commission has paid Rs 57.6 million to inflicted policyholders, 79 per cent of which pertained to comprehensive insurance covers. As a consequence of these events, insurers' capital cushions decreased, as evidenced by an average of 1.2 per cent decline in the ratio of capital to invested assets for the semester ended June 2024. Furthermore, during this period, the increase of 10.6 per cent in the cost of claims provisioned in the liabilities at Rs 15.1 billion as at end-June 2024 outpaced the expansion of 5.6 per cent in capital and reserves of non-life insurers which stood at Rs 10.1 billion.</p>	Source: Financial Services Commission Mauritius
Impacts on financial markets, at local or global scale	<p>The Stock Exchange of Mauritius (SEM) has formal procedures in place for cyclonic weather and torrential rains, which mandate market closures in specific circumstances to ensure safety and stability.</p> <p>On January 15, 2024, trading closed early due to the deteriorating conditions related to Cyclone Belal barreled into the capital, disrupting power and water supplies. The market and banks remained closed the following day.</p> <p>However, given that there were no major disruptions in the infrastructure, this did not trigger any major sell-off on the stock market. The domestic stock market was not impacted by the cyclone.</p>	
Impacts on public finances		
Other comments		

21. Tropical Cyclone in Mozambique (2019)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Tropical Cyclone Idai – March 2019 and Tropical Cyclones Kenneth in April 2019. This was the first time on record that two strong tropical cyclones have hit Mozambique during the same season (within six weeks' time and 600 miles distance from one to another impacts zones).	World vision Unicef
Date of occurrence for the event described in this survey	15-17 March 2019 (Idai) and 25 April 2019 (Kenneth).	Disaster Emergency Committee World vision
Geographical scale of occurrence for the event	Provinces affected: Zambézia, Sofala, Manica, Tete and Inhambane (50 districts in total).	Unicef
Type of hazard for the event	Cyclone.	Disaster Emergency Committee World vision
Magnitude and length	40°+ heatwave for 7 days, etc. Cyclone Kenneth, a Category 4 tropical cyclone, With sustained winds of up to 195 km/h and gusts of 220 km/h. Tropical Cyclone Idai makes landfall near Beira, Mozambique, as a Category 2 storm with sustained winds exceeding 105 mph.	Disaster Emergency Committee World vision
Impact on population of the hazard	The combined impact of the two cyclones, resulted in : Number of deaths: 603. Number of injured: 1,641. Number of displaced people: 160,927. Confirmed cholera cases: 6,768. Number of deaths due to cholera: 8. Number of students affected: 335,132.	Unicef
Which and how economic agents were primarily affected	The combined impact of the two cyclones, resulted in : Number of houses destroyed: 223,947. Crops destroyed: 715,378 ha. Classrooms damaged: 3,504. Health centers damaged: 93. More than 100,000 homes were damaged or destroyed.	

Overview of how the economy in was affected, with a focus on most impacted sectors	The United Nations estimated that Cyclone Idai and subsequent flooding destroyed more than \$773 million in buildings, infrastructure, and crops. More than 100,000 homes were damaged or destroyed. Cyclone Kenneth is estimated to have destroyed about \$100 million worth of homes, crops, and infrastructure, including boats and equipment belonging to coastal fishing villages.	Unicef
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Any other key characteristic deemed relevant

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	Following the cyclones, 2019 GDP growth dropped to 2.32%, down from 3.48% in 2018.	Institute of Statistics
	Inflation rate (in pp)	Homologous Variation had a marginal variation, registered the value of 3.50% in Dec 2019, after 33.52% in Dec 2018.	Institute of Statistics
	Unemployment rate (in pp)	Cumulative Change in Employment Indices was 0.5 in 2019, showing slight improvement.	Institute of Statistics
	Total import & export (gross or in %)	Exports fell to -1.04% in 2019, down from 5.95% in 2018. Imports fell to -8.83% in 2019, down from 17.93% in 2018.	Institute of Statistics
	Others	External Debt Stock (in Millions of USD) went up to 9,850.2 from 9,804.5 in 2018. Public Domestic Financing (millions of Meticaïs) went up 154,595,000 in 2019, from 139,377,160 in 2018. Lending to the economy (millions of Meticaïs) went up to 225,332.5 in 2019, from 217,115.4 in 2018. Bank lending interest rates went up to 21.03% in 2019, from 20.70% In 2018. The deposit rate went down to 8.71%, down from 11.32% in 2018, therefore increasing the spread. The trade balance deteriorated by USD 827 million, placing the deficit at USD 2,758.9 million in 2019.	Banco de Moçambique Ministry of Economy Institute of Statistics

Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors	Agriculture production (including animal production, hunting, forestry and fishing) dropped to 1.86%, down from 3.35% in 2018. Extractive industries production dropped to -1.67%, down from 10.35% in 2018. Sectoral Production of Accommodation, restaurants and similar dropped to 1.78%, down from 3.53% in 2018. Information and communication sector production dropped to 5.17%, down from 7.04% in 2018.	Institute of Statistics
	Food price index	Food products and non-alcoholic beverages, was the biggest contributor for inflation in 2019, with a cumulative contribution of 2.41%.	Institute of Statistics
	Insured and uninsured losses, in volume and in % of total losses		
	Other relevant variables		
Contagion and international spillover effects observed following the event	We can only refer to Exports that fell to -1.04% in 2019, down from 5.95% in 2018. No more data available on this issue.	Institute of Statistics	
Public measures taken to mitigate the impact of the disaster or boost the economic recovery			
Other comments			
3. FINANCIAL DISRUPTION			
Impacts on the banking sector	Financial activities output dropped to 4.33%, down from 4.49% in 2018, showing slight impact		
Impacts on the insurance sector	Cyclones Idai and Kenneth in 2019 caused over \$2 billion in economic damage across Southern Africa, primarily in Mozambique, yet only about 7% of these losses were insured, highlighting a 93% "protection gap". The disaster exposed low insurance penetration, causing significant losses to unprepared insurers and triggering increased interest in parametric, climate-resilient insurance models.	MIC Global	
Impacts on financial markets, at local or global scale			
Impacts on public finances	Budget deficit before donations (in million MT) went up to (96,186.8) (-9.4% of GDP) in 2019, from (76,857.7) in 2018 (-8.9% of GDP). External Debt Stock (in Millions of USD) went up to 9,804.5 after 9,850.2 in 2018. Public Domestic Financing (millions of Meticaís) went up 154,595,000 in 2019, from 139,377,160 in 2018. Bank lending interest rates went up to 21.03% in 2019, from 20.70% In 2018.	Ministry of Economy Banco de Moçambique Institute of Statistics	
Other comments			

22. Drought in Namibia (2019)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources		
1. EXTREME WEATHER EVENT				
General description of the event described in this survey	Severe drought of 2019: Regarded as the worst drought in 90 years, resulted in a widespread food shortage for one-third of the population who depended on drought relief (8.6% of whom were from rural areas), with roughly 60,000 livestock deaths, cereal production reduced by up to 80%, and increased scarcity of grazing for livestock and wildlife in all 13 regions of the country. The drought was also declared a national emergency.	World Bank Document (PDF) The 2019 drought in Namibia: An overview		
Date of occurrence for the event described in this survey	01 January to 30 December 2019.			
Geographical scale of occurrence for the event	National.			
Type of hazard for the event	Drought.			
Magnitude and length				
Impact on population of the hazard	It had an estimated 1.6 million people left with no food nationally.			
Which and how economic agents were primarily affected	Households, Manufacturing, agriculture, companies, tourism, electricity, government expenditures and public debt.			
Overview of how the economy in was affected, with a focus on most impacted sectors	Household income reduced, energy production reduced, water supply to manufacturing sector reduced, employment rates reduced food production reduced, and game population reduced impacting tourism sectors. Increased public spending results in increased deficit.			
Any other key characteristic deemed relevant	Covid-19 pandemic.			
2. ECONOMIC DISRUPTION				
Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	-0.8% year on year	NSA https://nsa.org.na/publications/	
	Inflation rate (in pp)	3.7		
	Unemployment rate (in pp)	43%		
	Total import & export (gross or in %)	49.42% and 37.83%		
	Others	Public debt		51.8
		Private debt		70.95
Trade Balance		-11.6		

Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors	According to the Bank of Namibia, the overall output of primary industries in Namibia was expected to decline in 2019. Due to extremely low rainfall in 2019, production in the sector fell by 17.5% and crop growing was most severely affected. As the area planted was smaller in 2019, output declined from a positive 10% in 2018 to a minus 18% in 2019. Moreover, livestock production was already in minus in 2018 and this declined further in 2019.	(PDF) The 2019 drought in Namibia: An overview
	Food price index	While overall crop production fell in 2019, cereal production in particular was estimated to be 53% lower than in 2018, and 42% lower than the 20-year average.	
	Insured and uninsured losses, in volume and in % of total losses		
	Other relevant variables		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery			
Other comments			
3. FINANCIAL DISRUPTION			
Impacts on the banking sector			
Impacts on the insurance sector			
Impacts on financial markets, at local or global scale			
Impacts on public finances			
Other comments			

23. Flood in the Netherlands (2021)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	<p>In July of 2021, large areas in the province of Limburg in the Netherlands were affected by extreme rainfall and floods. Around 50,000 people along the flooded rivers were evacuated, with total damages estimated around EUR 450 mln. In Limburg, no casualties occurred.</p> <p>Large parts of Belgium and Germany were also flooded, with even higher impact leading to high damages, losses and hundreds of casualties. The floods are considered an extreme event with enormous impact, and an exploratory fact-finding study was conducted to collect and analyse information.</p>	Kok et al. (2023)
Date of occurrence for the event described in this survey	13/14 July 2021.	Kok et al. (2023)
Geographical scale of occurrence for the event	In the Netherlands, the flood had a regional impact as it affected areas in Limburg, with Valkenburg reporting the most damages. However, the floods also affected parts of Belgium and Germany (but these areas were not included in this analysis).	Kok et al. (2023)
Type of hazard for the event	Flood due to heavy rainfall.	Kok et al. (2023)
Magnitude and length	<p>Precipitation accumulated to 80-160 mm in two days over a large region. Similar heavy precipitation events in this area are generally rare, especially during the summer season. When combining observations from past events with a large ensemble of model simulations, the probability of the Meuse two-day rainfall and peak discharge is around the order of 1:100 to 1:1,000 per year.</p> <p>The GRADE toolkit was used, which generates a synthetic time series of daily precipitation based on historical totals, serving as input for physical discharge calculations. GRADE is Rijkswaterstaat's standard tool for estimating extreme discharges of the Meuse at Borgharen and upstream sub-basins. A synthetic series of 50,000 years was constructed from historical precipitation and temperature data (Figure 2.7). Within this series, the July 2021 event is regularly exceeded in terms of peak discharge, but never during the summer period.</p>	Expertise Netwerk Waterveiligheid (ENW) (2021)
Impact on population of the hazard	<p>Around 50,000 people along the flooded rivers have been evacuated. Along the river Geul, specifically in Valkenburg, most people were not evacuated before the flood arrived, with the exception of some designated campgrounds and 193 people in health care institutions. Along the river Meuse, most people were evacuated before the arrival of the peak discharge. Finally, no fatalities were reported in the Netherlands and the majority of the people were able to evacuate themselves. The evacuation message was aimed at self-rescue of the inhabitants, which was successful. The number of people rescued by emergency services was limited, also in the severely flooded city of Valkenburg. Emergency measures, such as the place of sandbags, were coordinated by professionals but often executed by local residents.</p> <p>The majority of healthcare workers – around two thirds – reported an increase of patients with psychological complaints (i.e. stress, concerns, and anxiety). In addition, some healthcare workers reported an increase of patients with gastroenteritis, respiratory complaints, and skin infections. The impact of the floods on the drinking water extraction for the Dunea water supplier was limited, but substantial for suppliers Evides and WML. The drinking water well of the Maas and Eyserbeek were temporarily closed due to chemical and microbiological contamination. The reserve capacity was sufficient to prevent shortages of drinking water supplies, also due to the wet and mild summer.</p>	Expertise Netwerk Waterveiligheid (ENW) (2021)

Which and how economic agents were primarily affected	To estimate the damage, initially the regional and floodplain module of the Standard Method 2017 for Damage and Casualties from Flooding (Deltares, 2017) was used. This model incorporates the latest insights and knowledge on damage and casualty estimation. In 2021, insurers received around 25,000 damage claims due to July's flooding, most (10,000) in South Limburg. The majority involved private property – homes and vehicles – while fewer concerned business premises and vehicles. Additional losses included crops, business interruption, and extensive damage to uninsured public assets.	Expertise Netwerk Waterveiligheid (ENW) (2021)
Overview of how the economy in was affected, with a focus on most impacted sectors	Most damage reported to RVO under the Wts scheme concerned fixed assets, i.e., direct business losses. Second is infrastructure damage, followed by crop damage within the disaster area. Residential and household damages account for only a small share of RVO-handled cases, as most private losses were settled through insurers.	Kok et al. (2023)
Any other key characteristic deemed relevant	At three of four riverbank sites, post-flood litter density was over ten times higher than normal. Waste was found in vegetation, trees, and shrubs, dominated by soft plastic fragments and wet wipes (64%), compared to ~12% under normal conditions.	Kok et al. (2023)

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP / Total GVA (gross or in %)	
	Inflation rate (in pp)	
	Unemployment rate (in pp)	
	Total import & export (gross or in %)	
	Others	
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	
	Insured and uninsured losses, in volume and in % of total losses	Insurers paid out a total of €224 million in compensation for damages. Uninsured losses: 104 mln <i>via</i> the Act on Compensation for Damage in the Event of Disasters. Insurers and the government made major efforts to compensate for damages, yet some losses remained uncovered – such as those of companies with exchange policies and partly unclaimed turnover losses. This is estimated at roughly €60 million, about 15% of quantified damage.
	Other relevant variables	
Contagion and international spillover effects observed following the event		

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>The government partially covers flood risk through the Disaster Compensation Act (Wts), a structural scheme providing compensation for major disasters once declared by the state. It excludes full reimbursement and focuses on damage reasonably uninsurable, as applied in Limburg's 2021 floods. A total of €104 million in damages was assessed by loss adjusters, and €71 million was paid out.</p> <p>The municipalities of Valkenburg aan de Geul, Gulpen-Wittem, and Meerssen suffered significant infrastructure damages, particularly to sewer systems and roads. The Wts overview includes €16 million in assessed infrastructure damages (municipalities can also claim under Wts).</p> <p>The policy rule for crop damage compensation in the Meuse floodplains (July 2021) provides 65% reimbursement for losses. Total assessed damage was nearly €3.7 million; €2.7 million was requested, and €2.6 million paid. Not all assessed damage is compensated.</p>
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Other comments

3. FINANCIAL DISRUPTION

Impacts on the banking sector	No impact.
Impacts on the insurance sector	No significant impact. More insurers updated / improved the policy conditions (in line with standards from Verbond van Verzekeraars), and adjusted premiums accordingly, so that clear secondary flooding (like the ones around the river Geul) can be covered by insurance, both for households and businesses.
Impacts on financial markets, at local or global scale	
Impacts on public finances	
Other comments	

24. Flood in Pakistan (2022)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	Over the summer and autumn of 2022, Pakistan experienced unprecedented flooding across multiple regions, with one third of the country reportedly under water. The catastrophe was driven primarily by extreme monsoonal rainfall and glacial melting, leading to both riverine and flash flooding events. The worst flooding was concentrated along the Indus River, with provinces such as Sindh and Balochistan being most affected. The floodwaters destroyed thousands of homes, disrupted livelihoods, and severely damaged critical infrastructure. Without prearranged disaster funding in place, the government relied heavily on ex-post mechanisms and foreign aid, tightening an already constrained economic environment.	World Bank (2023)
Date of occurrence for the event described in this survey	From mid-June 2022, Pakistan experienced heavy monsoonal rainfall, with exceptional bursts that broke records during the month of August. The extreme rainfall led to the inundation of large sections of the country by late August. A reduction in rainfall led to river flow levels returning to normal by 26 th September.	World weather attribution (2022) Humanitarian Action (2023)
Geographical scale of occurrence for the event	Flooding affected Pakistan on a national scale, with reports of 94 districts being declared as “calamity hit,” making more than half of all districts in the country. Flood affected regions stretched from north to south, with inundation covering 75,000 km ² in August 2022. The worst impacts were concentrated in the provinces of Balochistan, Sindh, and Khyber Pakhtunkhwa.	World Bank (2023) Humanitarian Action (2023)
Type of hazard for the event	Extreme rainfall combined with accelerated glacier melt caused the Indus River to breach its banks, triggering widespread riverine flooding across low-lying floodplains and surrounding communities. Urban areas also experienced severe flash floods as intense downpours over short periods overwhelmed impermeable surfaces and poor drainage systems, leading to rapid surface water accumulation. A warm preceding spring had already intensified glacier melt, contributing to Glacial Lake Outburst Floods in the northern regions. Prolonged rainfall further saturated the soil, resulting in numerous landslides.	World weather attribution (2022) Red Cross
Magnitude and length	The primary cause of the flooding was extreme rainfall falling during the summer of 2022. The country observed its wettest July (+180%) and wettest August (+243%) since 1961, with the southern provinces, Balochistan and Sindh, showing monthly anomalies of +450% and +307% in July, and +590% and +726% in August.	World weather attribution (2022)
Impact on population of the hazard	In 2022, Pakistan had an estimated population of around 234 million people. It was reported that over 33 million people were affected by the floods (13.3% of the total population) with Sindh province accounting for 44% of those affected. The highest proportion of deaths and injuries was also located within Sindh, with 796 out of 1,735 fatalities and 8,422 out of 12,867 injuries. 7.9 million people were reportedly displaced (3% of the total population). Hundreds of thousands of refugees sought shelter in two primary districts, Peshawar in Khyber Pakhtunkhwa and Quetta in Balochistan.	Pakistan data, World Bank Humanitarian Action (2023)

Which and how economic agents were primarily affected	<p>The floods had multidimensional impacts, with vulnerable groups such as women and children being disproportionately affected.</p> <p>The scale of damage to buildings and in particular, people's homes were unprecedented, with over 2 million houses impacted by the floodwaters. Sindh province accounts for 89% of those destroyed (638 thousand out of 767 thousand) and of those damaged (1.1 million out of 1.3 million). Housing accounted for US\$5.6 billion out of US\$14.9 billion in damages, making it the most severely impacted sector.</p> <p>The floods claimed more than 1,700 lives, with around 20% of these deaths linked to indirect factors such as disease and malnutrition (6), partly due to damage of water supply systems and of sanitation facilities. An estimated 5.4 million people were left using unsafe drinking water as a result of the damage, while 6.3 million people were estimated to have lost access to their household sanitation facilities. Stagnant floodwaters triggered outbreaks of waterborne and vector-borne diseases, including cholera and malaria, and measles and rubella outbreaks were reported in 31 districts.</p> <p>Before the 2022 floods, Pakistan already had the world's second highest number of out-of-school children and high levels of child labour was also widespread, especially among those not enrolled in school. The floods compounded this crisis, severely disrupting education systems by damaging or destroying 25,187 schools (3), most of them in Sindh, leaving millions of children without access to learning and unfortunately, the pace of recovery for educational facilities was very slow.</p> <p>Farmers experienced significant destruction to their livelihoods, with over 1.1 million reported livestock deaths and FAO assessments estimating 9.4 million acres of agricultural land was inundated, with Sindh and Punjab provinces as the two largest agricultural-producing provinces, accounting for approximately 90% of the flooded agricultural area. Agriculture and livestock are not only sources of food but also vital to household livelihoods, with livestock often used as collateral for loans, including those taken to purchase seeds for crop planting. The destruction of food sources also significantly deteriorated Pakistan's food security situation. The IPC situation report from July to August 2022 put nearly 6 million people within Balochistan, Khyber Pakhtunkhwa and Sindh provinces experiencing high levels of acute food insecurity (IPC Phase 3 or above). This was projected to increase to 8.5 million people between September and December 2022. By April to October 2023, access to food remained difficult and populations experiencing IPC Phase 3 or above had grown further to 10.5 million people.</p> <p>A preliminary assessment of impact of floods on SMEs reported 197,658 economic establishments being directly or indirectly impacted. Among 242 surveyed businesses, major jobs losses were highlighted, with a 54% reduction in employment. Sectorally, firms operating in the services and agricultural industry were mostly affected. Around a third of businesses reported supply chain disruptions and over 40% reported experiencing destruction of most of their stock or inventory.</p>	<p>Aon (2022)</p> <p>Humanitarian Action (2023)</p> <p>WHO (2023)</p> <p>World Bank (2023)</p> <p>Relief Web (2024)</p> <p>FAO (2022)</p> <p>RRI&A report (2022)</p> <p>IPC (2022)</p> <p>IPC (2023)</p> <p>Pakistan Finance Minister (2023)</p> <p>GFDRR (2024)</p>
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Overview of how the economy in was affected, with a focus on most impacted sectors

The economic consequences of the floods were severe and far reaching, impacting multiple sectors and affecting future growth prospects. Total damages and economic losses were estimated to sum up to about US\$ 30bn (about 9.7% of Pakistan's FY22 GDP). Recovery and reconstruction needs exceeded US\$ 16 bn (about 5% of Pakistan's FY22 GDP).

Agriculture is an integral part of Pakistan's economy, contributing 24% of total GDP and 37.4% in employment in FY 23/24. Large areas of land, particularly growing the nation's staple crops such as rice and cotton were destroyed by floodwaters, reducing the country's availability to food and driving more people into poverty (14). Nearly all damage to irrigation and water infrastructure (98.5%) affected public assets, primarily flood protection systems and irrigation channels, further compounding agricultural disruption.

Telecommunications infrastructure sustained significant damage, including fibre optic transmission lines, feeder cables and transmission towers. Damage to transportation infrastructure caused compounding challenges for the movement of families and distribution of important aid. 13,115 kilometres of roads and around 439 bridges were damaged or destroyed nationwide, severely isolating communities and hindering evacuation efforts and the delivery of essential aid, food, and medical assistance to affected populations.

One in every 10 jobs in Pakistan is related to tourism. The 2022 floods caused major disruption to Pakistan's tourism sector, damaging infrastructure and private businesses, reducing visitor numbers, and forcing many sites to close. Hotels, restaurants, and tour operators suffered significant financial losses. Over 4,000 jobs were affected, with the greatest impact in Khyber Pakhtunkhwa and further losses in Sindh, Punjab, and Balochistan. Even undamaged areas saw reduced occupancy and business activity.

According to the government's Post-Disaster Needs Assessment (PDNA), the social protection, livelihoods, and jobs sector ranked third in terms of flood-related losses. This was due to the low coping capacity of populations and the wide spatial extent of the floods. It is estimated that, as a direct result of the floods, the national poverty rate increased by 4.0 to 4.3 percentage points, pushing over 9 million additional people into poverty.

Any other key characteristic deemed relevant

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact

GDP/Total GVA (gross or in %)

The floods resulted in US\$14.9 billion in damages (4.8% of FY22 GDP) and US\$15.2 billion in economic losses (4.9% of FY22 GDP) (1).

[World Bank \(2023\)](#)

[World Bank \(2023\)](#)

Pakistan's flood impacts compounded with an already fragile macro-financial context – marked by lingering COVID-19 effects, elevated fuel and borrowing costs, and political uncertainty. The figures below illustrate the sharp deterioration in FY23 compared to FY22. However, apart from the direct damages and impacts noted above, isolating the floods' contribution to this impact is not feasible.

Economic activity in FY23 slowed considerably, with declines in industry (-2.9% vs. 6.8% in previous year) and services (-0.5% vs. 6.6% in previous year) and only modest growth in agriculture (1% vs. 4.3% in the previous year). Consequently, real GDP is estimated to have dropped by 0.6%, compared to 6.1% growth in the previous year (15).

Quantitative estimates of the natural hazard's impact	Inflation rate (in pp)	Pakistan's price inflation climbed from 12.2% in FY22 to a record 29.2% in FY23. The rise was driven by flood-related disruptions to agriculture and supply chains, higher energy and petroleum prices, and Rupee depreciation. Food inflation soared from 13.4% to 37.3% in urban areas and from 13.0% to 40.8% in rural areas, largely due to flood damage to crops, livestock, and farming infrastructure such as wheat storage (15).	World Bank (2023)
	Unemployment rate (in pp)	Flood-related job disruptions were estimated at 4.3 million workers, about 20% of the pre-flood workforce, with Sindh bearing the most losses geographically (50%) and agriculture bearing the most losses sectorally (43%) (17). Projected job losses were around 1.8 million, with unemployment expected to climb to 8.5% in 2023 from 6.2% in 2021. While floods were the dominant driver, overlapping crises such as COVID-19 and macroeconomic instability also contributed to labour market stress (16).	ILO (2023) Ministry of Planning Development 1 Special Initiatives (2023)
	Total import & export (gross or in %)	Export volumes fell, with the reduced production of staples like rice, cotton, and sugar cane decreased Pakistan's exports by 13% (18). The destruction of agricultural output created an urgent need for food, driving a sharp rise in imports during the first two months of the fiscal year. Pakistan's food imports increased by 65.45%, with wheat imports surging by 2,435%, palm oil by 68.67%, and soybean oil by 255.36% compared to the same period last year (19). The floods devastated much of Pakistan's cotton crop, the primary input for the textile industry, leading to an import forecast in September for 2022/23 of around 5.8 million bales, which was approximately 29% higher than the previous year's estimate to offset shortages (20). Yet, overall, imports declined substantially (-18% in FY23) due to a shrinking economy and import restrictions that were put in place to preserve scarce international reserves (15). As exports declined in total less, however (-8.6% in FY23), the current account deficit in Pakistan narrowed in FY23. However, due to higher interest payments, the reversion of remittances and a financial account deficit, the balance of payment deficit led to a decrease in international reserves and the Rupee sharply depreciated against major currencies (15).	Van der Eng, AEPR (2024) Business Standard (2022) USDA FSA (2022)
	Others	Due to the corresponding macro-financial and public financial challenges around the same time period, a more detailed quantification of the flood impacts on public finances is currently not possible.	

Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	<p>The 2022 floods severely damaged agriculture stock and infrastructure, reducing agriculture growth to just 1.0% in FY23, compared to 4.3% in FY22. Major crop losses included cotton, dates, sugarcane, and rice (15).</p> <p>Cotton shortages hit the textile industry hard, as local cotton normally supplies about half of its needs. Textiles account for roughly 25% of industrial output and over 50% of goods exports. As a consequence, the impact was significant (15).</p>	World Bank (2023)
	Sectoral production for impacted sectors		
	Food price index	<p>The 2022 floods in Pakistan primarily affected agricultural heartlands such as Sindh and Punjab. The inundation of key crops such as wheat, sugarcane and primary vegetables caused a reduction and delay in yields and as a result, food prices increased dramatically. WFP reports prices for wheat flour increased by ~32%, pulses (moong) by ~57%, tomatoes by ~138%, potatoes by ~45%, and onions by ~44% between June and September 2022 (21). Food prices kept rising throughout 2022, and by December, the cost of a basic food basket was 36% higher compared to the same month the previous year (22).</p>	UN OCHA (2022) GFRC (2022)
	Insured and uninsured losses, in volume and in % of total losses	<p>Pakistan historically has and continues to have extremely low insurance penetration rates generally, with the ratio of total premiums to Gross Domestic Product (GDP) sitting at 0.7% in 2024. At the time, Pakistan had no public property insurance programme in place, leaving a large protection gap and meaning government, populations and international donors bear the brunt of losses. Disaster insurance remains underdeveloped for several reasons, such as limited understanding of catastrophe risk, and the absence of robust underwriting guidelines for catastrophe coverage (24). The physical damages at the time sat around US\$15 billion (26). Less than 1% of the affected assets were covered by insurance (23), with reports by Aon putting insured losses for the floods at approximately 100 million (25).</p>	Business Recorder (2026) World Bank – UKAid Beinsure (2026) REMIT (2023)
	Other relevant variables		
Contagion and international spillover effects observed following the event			

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>In response to the floods, the government and its partners launched a broad set of public measures to support economic recovery.</p> <p>The government relied heavily on support from international partners to secure additional funding for protection needs. Pledges from individual countries and development banks totalled USD 10.987 billion for reconstruction and recovery (32). However, reports of delays indicate that only a small fraction of these commitments materialised, with just USD 2.8 billion received by April 2024 (33).</p> <p>To support affected families, the federal government increased their flood relief cash assistance program significantly to over US\$ 316 million. This funding was distributed through the Benazir Income Support Program (BISP), with each flood affected family received US\$ 115 across the major provinces. By the middle of October 2022, 2.7 million families had been reached (28). The federal government also provided compensation of USD 4,522 to the family heirs of those who lost their lives in the flood. The funds were transferred to the National Disaster Management Authority (NDMA), who disbursed the payments to the families within 15 days (30).</p> <p>Under the Kissan Package 2022, the federal government launched 3 schemes to support farmers affected. First, the Markup Waiver Scheme granted a complete waiver of accumulated markup on outstanding agriculture loans of up to Rs 500,000 that were regular as of 30 June 2022 and allowed the principal to be rescheduled for up to one year. Second, the Government of Pakistan Markup Subsidy Scheme (GMSS). This was short-term financing of up to Rs 500,000 at 0% markup for a period of up to six months to subsistence farmers. Third, the interest free loans and Risk Sharing Scheme for Landless Farmers (IF&RSLF). This scheme provided interest-free loans of up to Rs 200,000 for up to six months to small, marginalized landless farmers and tenants (27). Government gave additional support to the agriculture sector through cash subsidies of Rs 14.99 billion, comprising Rs 6.56 billion from the federal government and Rs 8.39 billion from the Government of Sindh (28). Additional measures were launched more locally, such as in Punjab, the nation's highest agricultural producing province, where the government waived agricultural taxes for affected farmers and provided relief on their utility bills (31).</p> <p>With rising inflationary pressures (not only from the flood event but also the general macro-financial situation, e.g. the depreciating Rupee), the State Bank of Pakistan (SBP) continued to hike the policy rate throughout FY23, a trend that started in the second half of 2021. Since July 2022, the SBP has increased the policy rate by a cumulative 825 bps to reach 22.0% by end-FY23 (32).</p>	<p>Business Recorder (2022)</p> <p>Humanitarian outcomes (2022)</p> <p>Business Recorder (2023)</p> <p>Pakistan today (2022)</p> <p>INP (2025)</p> <p>Business Recorder (2023)</p> <p>Business Recorder (2024)</p>
Other comments	<p>Since the devastating floods of 2022, Pakistan has made notable progress in strengthening financial resilience and disaster risk management. The crisis highlighted the need for structured, proactive mechanisms, leading to the approval of Pakistan's first National Disaster Risk Financing Strategy (NDRFS). This strategy sets out a comprehensive framework for risk-layered financing, combining instruments such as sovereign insurance, contingent credit lines, and catastrophe bonds to reduce fiscal exposure to disasters.</p> <p>These shocks disproportionately affected the microfinance sector due to its concentration in rural and agriculture-dependent regions. The World Bank's Resilient and Accessible Microfinance (RAM) Project was a direct response to the repeated climate shocks that have hit Pakistan in recent years, including the catastrophic 2022 floods. Approved in March 2025, this project aims to strengthen the resilience of Pakistan's microfinance sector and its borrowers, in particular the most vulnerable communities, against climate shocks such as floods. The project's core goal is to ensure that microfinance providers (MFPs) can continue to provide essential financial services and recovery loans even after severe climate events.</p> <p>The project has established a Climate Risk Fund (CRF), which is a dedicated fund to provide contingent liquidity to microfinance providers after qualifying climate shocks, initially focusing on flood risk. This will enable MFPs to offer 'recovery loans' to affected borrowers, helping them rebuild livelihoods and maintain financial stability. In the case of more severe shocks, the fund will be backstopped by a parametric insurance product. This instrument will provide additional and timely injections of capital into the fund, based on pre-defined, objective triggers. By doing so, this layered financing mechanism aims to maintain the microfinance sector's balance sheets and prevent capital depletion, while at the same time ensuring continued financial access to Pakistan's poor, the main borrowers of the microfinance sector (34).</p>	<p>World Bank (2025)</p>

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>Based on regulatory data, the flood-induced incremental nonperforming loans in the banking and microfinance sector were estimated at US\$ 392 million in total, with a breakdown of US\$ 121 million for commercial banks, US\$ 157.8 million for microfinance banks, and US\$ 113.1 million for microfinance institutions (1).</p> <p>The microfinance sector has been particularly hit. Between June and September 2022, NPLs of microfinance banks in flood-affected areas rose 25.7% quarterly and 53.4% year-on-year, pushing the aggregate NPL ratio from 6.5% to 7.8%. Provisions surged 50.8%, reducing capital adequacy from 14.9% to 11.7% (below the 15% regulatory minimum), which constrained lending, especially in flood-hit areas (34).</p> <p>For the entire financial sector, NPLs increased from 7.5% in June 2022 to 7.8% in March 2023, yet, the compounding macro-financial issues in Pakistan at the time (see above) likely also contributed to this increase (15).</p>	<p>World Bank (2023)</p> <p>World Bank (2025)</p> <p>World Bank (2023)</p>
Impacts on the insurance sector	<p>The insurance sector accounts for roughly 5% of total financial services assets. The 2022 floods generated insurance claims of US\$ 95.9 million across life and nonlife sectors, with the majority (86%) linked to infrastructure, mainly roads and dams (US\$ 82.4 million), followed by agriculture and livestock claims (US\$ 7.9 million). Of these, most were reinsured abroad, leaving only US\$ 25.3 million of domestic uninsured or reinsurance-at-risk claims, plus US\$ 0.9 million in infrastructure losses. Low insurance uptake in heavily affected sectors meant there was no immediate surge in premiums. Larger insurers remained largely insulated due to reinsurance coverage (up to 95%) and resulted in the overall liquidity impact on the sector being minimal.</p>	<p>World Bank (2023)</p>
Impacts on financial markets, at local or global scale		
Impacts on public finances	<p>With limited prearranged Disaster Risk Financing (DRF) instruments at the time of the floods, the government was forced to absorb much of the financial burden (e.g. the flood relief program), placing strain on the public budget and relying on ad hoc borrowing, heightening an already challenging financial position. Fiscal revenues were expected to weaken due to a shrinking tax base and reduced economic activity.</p> <p>Due to the corresponding macro-financial and public financial challenges around the same time period, a more detailed quantification of the flood impacts on public finances is currently not possible.</p>	<p>World Bank (2023)</p> <p>Van der Eng, AEPR (2024)</p> <p>World Bank (2024)</p> <p>REMIT (2023)</p>
Other comments		

25. Central European Flood – Poland (2024)

This case study was produced as part of an NGFS note on the macroeconomic and financial impacts of extreme physical risks.

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	2024 Central European Flood. The flood that occurred in September 2024 was a river flood caused by prolonged and intense rainfall. During this flood, water also overflowed flood protection structures and flood protection structures failed. It was the largest flood in Poland since 2010, and in southwestern Poland since 1997.	Polish Waters (State Water Holding) https://www.gov.pl/web/wody-polskie/rok-po-powodzi-intensywne-dzialania-wod-polskich-na-rzecz-odbudowy Polish Academy of Sciences Report https://pan.pl/app/uploads/2025/11/Raport-Zespolu-ds.-Odbudowy-Odpornosci-po-Powodzi-KNoWiGW-PAN.pdf
Date of occurrence for the event described in this survey	13 September – 4 October 2024.	Polish Waters (State Water Holding) https://www.gov.pl/web/wody-polskie/rok-po-powodzi-intensywne-dzialania-wod-polskich-na-rzecz-odbudowy
Geographical scale of occurrence for the event	Southwestern Poland. The flooding occurred in particular in the provinces of Dolnoslaskie, Opolskie, Slaskie, and Lubuskie, as well as in small parts of Malopolske, Zachodniopomorskie, and Wielkopolskie.	Polish Waters (State Water Holding) https://www.gov.pl/web/wody-polskie/rok-po-powodzi-intensywne-dzialania-wod-polskich-na-rzecz-odbudowy
Type of hazard for the event	Flood.	Polish Waters (State Water Holding) https://www.gov.pl/web/wody-polskie/rok-po-powodzi-intensywne-dzialania-wod-polskich-na-rzecz-odbudowy
Magnitude and length	Flood start date: 13 September 2024. Flood end date: 4 October 2024. Duration: 22 days. After extremely high rainfall on 13-15 September, flood waves quickly formed on the rivers of the upper and middle Odra basin, which very quickly exceeded the alert level. The highest number of alert level exceedances (81) was recorded in September. For example, the maximum exceedance of the alarm water level indicator was 454 cm in Krzyżanowice on 17 September 2024.	Report on the review and update of the preliminary flood risk assessment in the third planning cycle Raport z powodzi we wrześniu 2024 r.

Impact on population of the hazard	<p>Number of deaths: 9.</p> <p>Number of people injured: 238,045 (0.64% of total Polish population).</p> <p>Number of people evacuated: approximately 4,493.</p>	<p>Report on the review and update of the preliminary flood risk assessment in the third planning cycle</p> <p>Raport z powodzi we wrześniu 2024 r.</p>
Which and how economic agents were primarily affected	<p>Number of buildings destroyed or taken out of use: 421, including 273 residential buildings and 148 farm buildings.</p> <p>Number of flooded buildings of particular social importance: 814, including: schools, kindergartens, nurseries, offices, social welfare centers, social welfare homes, museums, cultural centers, libraries, fire department buildings, police stations, health centers.</p>	<p>Report on the review and update of the preliminary flood risk assessment in the third planning cycle</p> <p>Raport z powodzi we wrześniu 2024 r.</p>
Overview of how the economy in was affected, with a focus on most impacted sectors	<p>As a result of the flood, 68,000 hectares of agricultural land were flooded, of which approximately 25,000 areas were used for crop production.</p> <p>The total length of damaged roads is approximately 3,633 km. Approximately 127 km of bicycle paths, 229 bridges, and 1,823 culverts have also been destroyed.</p> <p>TC Winston produced different effects across the various sectors, with the most significant impacts felt by the productive and social sectors.</p> <p>The individual sectors that sustained the greatest damage were housing, accounting for 58 percent of total damage costs, followed by transport, accounting for 10 percent of all damage.</p> <p>The highest level of production losses expected was in the agriculture sector at 65 percent of total losses.</p>	<p>Polish Academy of Sciences Report</p> <p>https://pan.pl/app/uploads/2025/11/Raport-Zespołu-ds.-Odbudowy-Odpornosci-po-Powodzi-KNoWiGW-PAN.pdf</p> <p>Report on the review and update of the preliminary flood risk assessment in the third planning cycle</p> <p>Raport z powodzi we wrześniu 2024 r.</p>
Any other key characteristic deemed relevant	<p>In connection with the flood Poland applied to the European Commission for financial assistance from the European Union Solidarity Fund on 29 November 2024. The total amount of expenses and losses reported by provincial governors and ministries amounted to over PLN 13 billion.</p>	<p>Report on the review and update of the preliminary flood risk assessment in the third planning cycle</p> <p>Raport z powodzi we wrześniu 2024 r.</p>

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	Damage by the flood may be relatively benign, c. 0.3-0.7% of GDP.	https://think.ing.com/snaps/updated-september-floods-to-cause-limited-damages-but-gdp-impact-could-be-higher/
	Inflation rate (in pp)	The pronounced impact on prices has not been expected.	https://think.ing.com/snaps/updated-september-floods-to-cause-limited-damages-but-gdp-impact-could-be-higher/
	Unemployment rate (in pp)	In the provinces of Dolnoslaskie, Slaskie, Opolskie, and Lubuskie, where a state of natural disaster has been declared, the unemployment rate in September this year was 4.6%, 3.6%, 5.7% and 4.3% respectively, and thus only in the Opolskie Province did it exceed 5%, which is the rate for the country as a whole.	https://www.gov.pl/web/rodzina/bezrobocie-we-wrzesniu-2024-na-poziomiu-5-proc-gus-potwierdzil-szacunki-mrpips
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses	This event was reported by 20 domestic insurance companies. According to the information provided in the survey, the total gross loss from direct business and active reinsurance amounted to PLN 2,092 million, of which PLN 1,505 million was transferred under reinsurance. Due to the large extent of the damage, the companies were required to provide additional reporting on this disaster. According to the latest information (as of 30 June, 2025), the value of this damage amounts to PLN 2,129 million. The reinsurers' share amounted to PLN 1,528 million.	Information concerning catastrophic events in 2024 KNF
Other relevant variables	N/A.		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery			
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector

Impacts on the insurance sector

Impacts on financial markets, at local
or global scale

Impacts on public finances

Other comments

26. Wildfires in Portugal (2017)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	The 2017 wildfires in Portugal were the largest wildfire events in the territory since at least 1975 (first year for which there is data). The event refers to two major wildfire occurrences (one in June and one in October). The burnt area totaled 560,000 hectares, with 107 deaths due to direct effects of the wildfires. The exceptionality of these two events holds on an unusual combination of fire weather conditions outside the summer season.	
Date of occurrence for the event described in this survey	The first event started on 17 June 2017 and the second on 15 October 2017.	
Geographical scale of occurrence for the event	Local.	
Type of hazard for the event	Wildfires.	
Magnitude and length	<p>The wildfires starting on 17 June were associated with a severe heat wave, causing 66 deaths. Their impact was concentrated in terms of territory (Pedrógão Grande and Góis municipalities) and of the number of firms directly affected.</p> <p>The wildfires starting on 15 October were boosted by a prolonged drought period combined with the strong winds caused by hurricane Ophelia and were associated with a high number of negligent outbreaks. They occurred outside the typical wildfire season and covered a wide area in Central and Northern Portugal, with burnt areas scattered across several districts, in particular Aveiro, Coimbra, Guarda, Castelo Branco, Leiria and Viseu. Half of the total burnt area in 2017 corresponds to these wildfires, which caused 51 direct deaths.</p>	<p>Ramos, A. M., Russo, A., Da Camara, C. <i>et al.</i> (2023)</p> <p>San-Miguel-Ayanz, J., Durrant, T., Boca, R., <i>et al.</i> (2018)</p> <p>San-Miguel-Ayanz, <i>et al.</i> (2020)</p>
Impact on population of the hazard	114 deaths linked directly to these two events.	
Which and how economic agents were primarily affected	<p>Beyond the death toll presented above:</p> <p>Households: several houses were burnt, primarily second homes (i.e., not the main primary household dwelling).</p> <p>Companies: destruction of several facilities, with many of which located in industrial zones.</p> <p>Companies operating in the agriculture, livestock, and forestry sectors, including timber and pulp production, experienced an average decrease in assets (-9%) and number of employees (-7%).</p>	Lopes, M. C., & Póvoa, I. (2022)
Overview of how the economy in was affected, with a focus on most impacted sectors	We find evidence that the most impacted firms, in terms of credit risk, were from activity sectors such as crop and animal production, hunting and related service activities, forestry and logging, wood industry; and manufacture of pulp and paper.	
Any other key characteristic deemed relevant	Following the major fires of 2017, the Government developed a strategy to combat rural fires, strengthening both prevention, through forest protection, and the safeguarding of people and property in the event of rural fire occurrences. This strategy also includes an assessment of structural wildfire hazard for mainland Portugal, carried out and published by the Institute for Nature Conservation and Forests (ICNF), in coordination with the National Authority for Emergency and Civil Protection (ANEPC), the Directorate-General for the Territory (DGT), and the Agency for Integrated Rural Fire Management (AGIF).	

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	According to the Portuguese Government the damage costs from the June and October 2017 wildfires amounted to 0.8% of GDP that year (1,5 billion euros).	San-Miguel-Ayanz, et al. (2020)
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses	According to an assessment by the Portuguese Association of Insurers (APS), these wildfires also correspond to the largest insured loss in Portugal, with claims (paid or provisioned) amounting to more than €230 million, of which €150 million corresponded to damage to establishments linked to commercial and industrial activities.	
	Other relevant variables		
Contagion and international spillover effects observed following the event			
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	Public support measures such as targeted subsidies and public guaranteed loans were established following the wildfires.		
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	In a DiD setup, we find evidence of an increase in the probability of default of firms directly affected by the wildfire of sectors more sensitive to the impact of wildfires (crop and animal production, hunting and related service activities, forestry and logging, wood industry; and manufacture of pulp and paper). However, the increase in credit risk was only material in 2018 (for the median risk firm, the effect corresponded to an increased in PD of 0.5 p.p., from 1.9% to 2.5%), the year following the event, before unwinding in subsequent years.	Annual Report on the banking sector's exposure to climate risk (2025)
Impacts on the insurance sector	According to an assessment by the Portuguese Association of Insurers (APS), these wildfires also correspond to the largest insured loss in Portugal, with claims (paid or provisioned) amounting to more than €230 million, of which approximately €150 million corresponded to damage to establishments linked to commercial and industrial activities.	
Impacts on financial markets, at local or global scale		
Impacts on public finances		
Other comments		

27. Flood in South Africa (2022)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	The KwaZulu-Natal floods that occurred in 2022 were the most important event since 1990. The floods primarily affected households and infrastructure. Approximately 3,900 households were destroyed, and critical infrastructure such as major roads, bridges, communication and electrical systems were damaged.	
Date of occurrence for the event described in this survey	Two primary intense rainfall episodes occurred: the first in early May (May 1-3) and a second, more extensive event in mid-May (May 16-17), 2023.	
Geographical scale of occurrence for the event	The floods were mainly in the KwaZulu-Natal province. The municipalities that were most affected were eThekweni, iLembe and Ugu.	
Type of hazard for the event	Floods, landslides, flash floods.	
Magnitude and length	Heavy rains for multiple days followed by flooding and landslides. On 11 and 12 April, 200 to 400 mm of rainfall happened in the area. On 13 April 2022, the floods were declared a provincial disaster which indicates the magnitude of the event. On 18 April 2022, this was accelerated to a national state of disaster by President Cyril Ramaphosa.	
Impact on population of the hazard	Approximately 19,000 households and 128,000 people have been negatively affected directly by the floods. Over 400 people have died and 48 people were missing or unaccounted for.	
Which and how economic agents were primarily affected	Households, informal communities, formal businesses, infrastructure operators and public utilities were all affected by the disaster. Manufacturing, trade and transport contributes significantly to provincial GDP, and they were all heavily disrupted due to logistics and infrastructure breakdowns.	Wesgro research (2022)
Overview of how the economy in was affected, with a focus on most impacted sectors	Roads, rail links and supply routes were damaged which led to disruption of movement of goods and services which affected many firms in the area. Flood waters and landslides damaged agricultural land and livestock, especially in rural areas. In terms of the public sector, government bodies had to reallocate budget resources to disaster relief and infrastructure rebuilding. The damage to infrastructure has an estimated cost of more than R10 billion. The City of Durban lost an estimate of 1.8% of the city's annual GDP due to the disaster.	The Presidency Republic of South Africa (2022)
Any other key characteristic deemed relevant	The Port of Durban, which is the one largest and busiest shipping terminals on the continent was severely affected by the floods. Access to the port was disrupted due to damage to the roads that connects the port to the rest of the country.	The Presidency Republic of South Africa (2022)

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	The floods (in addition to load-shedding) yielded a 0.7% drag on GDP in Q2 2022 according to South Africa's national statistics office (Statistics South Africa, 2022) (1). The floods cost Durban 1.8% in annual GDP losses (2).	Statistics South Africa, 2022 Presidential Climate Commission, 2022
	Inflation rate (in pp)		
	Unemployment rate (in pp)	31,220 jobs were affected by the floods with 68% of these affected jobs concentrated in a municipality named eThekweni Municipality. Durban's expanded unemployment rate rose from 36.8% in Q1 2022 to 37.9% in Q2 2022 due to the impacts of the floods, especially on manufacturing and transportation. Moreover, following the floods, the rate of workplace activity was 6% lower than pre-pandemic levels in the province.	Republic of South Africa, 2022 The Durban EDGE, 2022 Wesgro, 2022
	Total import & export (gross or in %)	The 2022 KZN floods caused major damage to the Durban port, though exact figures are not recorded. One week following the floods, port terminals were operating at 60-100% capacity with a backlog of 8,000 to 9,000 containers. The Durban port handles 60% of South African citrus trade. It took up to 50 days to export grapes, for example, following the aftermath of the flood because of the bottlenecks at ports.	Reuters, 2022 Business Partners, 2022 Southern Africa's Freight News, 2022
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	Manufacturing declined by 5.9% due to the floods' impact on the KZN manufacturing supply chain, which makes up 20% of national manufacturing in Q2 of 2022. Similarly, the damage done by the floods had negative consequences for the trade, catering and accommodation sector which declined by 1.5% in part because of flood damage to retail outlets and store facilities. The mining sector was also dragged by decreased coal production due in part to the impacts of the floods. Some disruptions to the water sector were also induced by the KZN floods. For the eThekweni Municipality, R12.6 million in damages to agriculture were recorded, R18 million to construction R46 million to wholesale and retail and R33 million to warehousing and logistics.	Statistics South Africa, 2022 Presidential Climate Commission, 2023
	Sectoral production for impacted sectors		
	Food price index	The Durban food basket increased by 13.6% year on year in May 2022 (the month following the KZN floods). The equivalent of Pietermaritzburg (the second largest city in KZN) basket increased by 12.9%. The month-on-month increase was 2.8% in Durban and 3%.	Heinrich Boll Stiftung, 2022
	Insured and uninsured losses, in volume and in % of total losses	Most businesses on the KZN floodplain are unable to get insurance due to the high level of exposure to natural disasters and climate hazards. The floods caused total losses worth approximately R54 billion, but the insurance sector only covered half of these losses.	Wesgro, 2022 Santam, 2024
	Other relevant variables		

Contagion and international spillover effects observed following the event	Transport and port bottlenecks caused by the floods had material impacts on exports, particularly food exports. Damage to infrastructure yielded provision of services including portable water, electricity, sanitation and waste management, stormwater management, and the provision of housing.	Southern Africa's Freight News, 2022 Wesgro, 2022 Presidential Climate Commission, 2023
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	Three distinct measures were taken to address the floods within the first year following their occurrence. First, immediate humanitarian relief was dispensed to affected parts of the province, including the issuance of R1 billion in disaster relief funding by the National Treasury. The first phase also external funding for relief including over R5,351,866 released by the International Federation of Red Cross's disaster relief fund and the provision of food hampers to support 20,000 beneficiaries in rural KZN. The second measure taken was about stabilization and recovery. The final phase was reconstructing and rebuilding, including the implementation of climate change education provision to community members.	National Treasury, 2022 International Federation of Red Cross and Red Crescent Societies, 2022 Ashrafal Aid, 2022 KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs, 2023
Other comments	The floods caused more than R10 billion in infrastructure losses (\$674.88 million). At least 826 companies were impacted by the floods. The KZN floods represented the costliest natural disaster for the country a total of \$3.6 billion.	Reuters, 2022 Republic of South Africa, 2022 Climate Action Transparency, 2023

3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>While detailed quantitative data on credit losses or balance-sheet impacts from the KZN floods specifically is limited in public reporting.</p> <p>Bank branch closures: Major banks like Standard Bank reported that multiple branches and support facilities in the South Coast, Durban area and northern KZN had to close temporarily due to flood damage or because staff and clients could not safely access them. This disrupted normal banking services in affected communities.</p> <p>Fee and cost relief for clients: Banks such as Absa waived certain fees – for example, excess payments related to motor and property flood claims – to help customers manage financial losses and claims following the floods. This reflects practical operational responses but also implies short-term revenue impacts for banks.</p> <p>Operational burden: Some banks deployed special teams to handle spikes in customer requests and claims issues related to flood impacts.</p> <p>Standard Bank 2022 Annual Financial Statement does not discuss the floods as a distinct item in credit risk disclosures or losses. However, the fact that Standard Bank included narrative about the floods in its societal impact reporting shows the event was acknowledged at a corporate level, albeit outside the strict IFRS financial statement notes.</p> <p>In Nedbank's 2022 interim results commentary, the bank mentions that the KZN floods were part of the broader macroeconomic environment affecting performance, even though detailed quantified flood-related impacts were not broken out as a separate financial statement line item.</p>	CHRO, 2022 News24, 2022 Standard Bank 2022 Nedbank 2022
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Impacts on the insurance sector	<p>About half of total losses (R27 billion out of R54b) was covered by insurance. The insurance industry faced claims totalling just over R15 billion. Santam, South Africa's largest non-life insurer, recorded its largest flood loss in 105 years.</p> <p>The climate change risk exposure on the insurance book remains within risk tolerance. However, there is a growing pushback against offering flood cover in specific areas.</p> <p>The heavy claims hit insurers' underwriting margins: Santam recorded significantly weaker results in the period including the flood – its net underwriting margin fell below targets and the property class was notably affected.</p> <p>Large catastrophe payouts like the KZN floods put upward pressure on reinsurance premiums and contributed to broader increases in insurance premiums in South Africa.</p> <p>Insurers' perception is that the impact of the KZN floods was exacerbated by poor urban planning and inadequate infrastructure, presenting a unique challenge to insurers.</p> <p>The extraordinary volume of claims following the floods strained insurers' claims assessment and administrative capacity. Industry commentary notes shortages of assessors and repair resources, leading to delays and higher surge costs for rebuilding.</p> <p>Tokio Marine & Nichido Fire Insurance sued the provincial and municipality governments for R6.5 billion over damages Toyota South Africa claiming the defendants failed to maintain critical flood prevention infrastructure, shifting liability for catastrophic events on public authorities.</p> <p>Similarly, the insurer of Caxton and CTP Publishers filed a R339 million claim for damages to its Prospecton facility.</p>	<p>Santam, 2023</p> <p>FIA, 2025</p> <p>Daily Investor 2025</p> <p>BusinessTech, 2022</p> <p>Satori 2023</p> <p>Business Insider, 2025</p> <p>IOL, 2025</p>
Impacts on financial markets, at local or global scale	<p>No strong evidence in publicly available financial reporting or market commentary that the Johannesburg Stock Exchange (JSE) as a whole experienced a discernible, sustained downturn solely because of the KZN floods in April 2022. The macroeconomic impact of the floods, while significant locally and regionally, was not large enough relative to South Africa's total economy to move broad indices sharply.</p> <p>Individual companies affected by the floods (e.g., Toyota-linked firms) likely faced operational issues that could influence their share prices, but there's no widely cited market-level event study showing systematic stock price effects exclusively driven by the floods.</p>	<p>News24, 2022</p>
Impacts on public finances	<p>The 2023 Medium-Term Budget Policy Statement (MTBPS) acknowledged the burden of natural disasters (including the 2022 floods) on government spending and revenue prospects. Emergency allocations had to be accommodated within the broader fiscal framework, contributing to upward pressure on spending in the budget year.</p> <ul style="list-style-type: none"> • R3.6 billion was allocated to the Department of Cooperative Governance and Traditional Affairs for reconstruction and rehabilitation of municipal infrastructure. • R1.8 billion was allocated to the Department of Transport for maintenance and rebuilding of roads damaged by the floods. • Transnet (the state freight and ports company) received R2.9 billion for damage-related repairs. The Mail & Guardian. • Treasury reports for 2023/24 show continued releases of funding to municipalities affected by the 2022 floods and other disasters – for example, R372 million through the Municipal Disaster Response Grant for repair and reconstruction projects. <p>While precise quantification in official budget documents of how much the floods alone worsened the national budget balance (e.g., deficit as % of GDP) is not typically separated out in headline numbers, the cumulative unplanned spending and funding gaps have contributed to greater overall expenditure pressures, adding to structural deficits and limiting fiscal flexibility.</p>	<p>Budget 2024</p> <p>Mail & Guardian 2023</p>
Other comments	<p>Rand depreciated (by 7% against the dollar)</p>	<p>Reuters 2022</p> <p>AnchorCapital 2022</p>

28. Flood in Spain (2024)

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Questions	Responses	Sources
1 EXTREME WEATHER EVENT		
General description of the event described in this survey	In late October and early November 2024, eastern Spain was hit by a very intense cut-off low (cold drop or DANA) weather event, causing heavy rain and flash flooding. On 29 October, extremely high rainfall fell in a short time, especially in Valencia province and parts of Albacete, Cuenca, and eastern Andalusia. Due to its scale and intensity, this was one of Spain's most severe flood disasters in decades.	
Date of occurrence for the event described in this survey	It occurred mainly on 29 October 2024, within a broader episode spanning late October to early November 2024.	
Geographical scale of occurrence for the event	Regional and local.	
Type of hazard for the event	Severe flash floods.	
Magnitude and length	Over 600 km ² affected, up to 770 l/m ² of precipitation in 24 hours in some areas on October 29, 2024.	The Spanish State Meteorological Agency (AEMET), 2024
Impact on population of the hazard	Significant loss of life with 235 victims mostly in the Valencian Community, and severe material damage. Thousands of people were injured or required emergency assistance, and approximately 15,000 residents were displaced due to the destruction or severe damage of their homes. Beyond immediate fatalities, the floods generated long-term public health consequences (psychological trauma, increased anxiety and depression).	
Which and how economic agents were primarily affected	Households, companies, financial institutions.	
Overview of how the economy in was affected, with a focus on most impacted sectors	<p>The economic impact of the DANA was multi-sectoral.</p> <p>1) Disruption of economic activity: the standstill in sectors such as the wholesale and retail trade, transportation, tourism and construction in the weeks following the flash floods triggered a temporary drop in GDP, as indicated in our end-2024 projections (Banco de España, 2024).</p> <ul style="list-style-type: none"> • Commuter difficulties as a result of the mobility restrictions, which halted production at various firms. • Damage to roads and railways led to disruptions in the transportation of goods. For example, the diversion of traffic due to motorway closures led to supply delays and higher production costs. • Problems in accessing banking services and with means of payment (including damaged banknotes) hampered activity. The Banco de España monitored these problems closely and helped mitigate them. • Sharp spike in the “supply bottlenecks” index following the flash floods (similar to that observed after Hurricane Katrina in 2005), which gradually diminished after a fortnight. • Damage to infrastructures and tourist establishments and beaches led to a decline in hotel and restaurant reservations in the region. <p>2) Destruction of capital stock and wealth: a wide range of physical assets were damaged or destroyed in the flood-stricken areas, affecting the wealth of households (e.g. homes and vehicles), firms (e.g. commercial premises, factories, lorries and machinery) and public infrastructure (e.g. transport networks, educational institutions and government facilities).</p>	<p>Kataryniuk, I. and A. Fernández (2025)</p> <p>Banco de España (2024)</p>
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	<p>According to Banco de España (2024), the evidence available suggests that the negative impact of the flash floods on GDP growth in Spain in Q4 is relatively contained (between 0.1 pp and 0.2 pp).</p> <p>The hit to wealth is much greater than the impact of the flash floods as reflected in the GDP, which comes to mere fractions of a percent. Some estimates point to the wealth lost in Valencia province amounting to more than €17 billion – more than 20% of its GDP in 2023. (IVIE, 2025).</p>	<p>Banco de España (2024) IVIE (2025)</p>
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses		
	Other relevant variables		
Contagion and international spillover effects observed following the event	No international effect		
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>According to the Spanish Insurance Compensation Consortium (CCS)*, the October 2024 DANA in Valencia generated around 250,000 insurance claims, more than 95% of them in Valencia province. By late 2025, the CCS had paid over €4 billion in compensation and estimated the total insured cost at approximately €4.8 billion, making it the most costly natural disaster ever managed by the Consortium.</p> <p>The Spanish Insurance Compensation Consortium (Consortio de Compensación de Seguros, CCS) is a public entity attached to the Ministry of Economy that provides insurance coverage for extraordinary risks, such as floods, earthquakes, and hurricanes. It compensates insured individuals and businesses when these events occur, especially when private insurers cannot cover the losses, and is funded through a surcharge on insurance premiums in Spain.</p> <p>Other financial measures that contributed to mitigating the impact of DANA on local economy:</p> <ul style="list-style-type: none"> • Direct support for firms (between €10,000 and €150,000, depending on their turnover in 2023) and the self-employed (€5,000). • A one-off increase of 15% in payments under the minimum income scheme. • Special tax relief and tax reductions for agricultural activities. • Support for persons facing personal injuries or damage to housing or commercial premises. 	<p>Press release. Spanish Insurance Compensation Consortium Royal Decree-Law 6/2024, November 5, 2024</p>	
Other comments			

3. FINANCIAL DISRUPTION

Impacts on the banking sector	According to the analyses done by the Banco de España (see Pérez Montes <i>et al.</i> 2024), the floods did not pose a systemic risk to the Spanish banking sector. While there was a moderate rise in the share of non-performing loans in affected municipalities starting from December 2024 (0.4 pp or 9% of the average for households and 0.5 pp or 3% of the average for corporate borrowers), these effects were localized and manageable at the national level as the affected areas account for roughly 2% of the country's credit and economic activity.	Pérez Montes, C. et al. (2024)
Impacts on the insurance sector		
Impacts on financial markets, at local or global scale		
Impacts on public finances	<p>In 2024 alone, the measures adopted to mitigate the consequences of the DANA storm amounted to €5.59 billion (0.35% of GDP).</p> <p>The Spanish Government took urgent measures (Royal Decree-Law 6/2024) that sought not just to protect people, but also to help restore normality and prevent a sharper economic downswing in the areas affected.</p> <p>Among other measures, Royal Decree-Law 6/2024 includes:</p> <p>An ICO guarantee facility, to mobilise financing for households, businesses and the self-employed, by making it easier for them to access liquidity and obtain new lending to alleviate the damage caused by the flash floods.</p> <p>Loan moratoria for consumers, the self-employed and SMEs affected, suspending their loan repayments and interest payments to help ease their debt burden.</p> <p>In addition, much of the insured damage was covered by the Consorcio de Compensación de Seguros (CCS).</p>	<p>Spanish Annual Progress Report to European Commission (2025)</p> <p>Azqueta, A. and A. I. Hernández (2025)</p>
Other comments	<p>The Banco de España closely monitored the availability of cash in the affected areas, ensuring the functioning of ATMs and implementing exceptional measures to exchange damaged banknotes and coins (Banco de España, 2025).</p> <p>– Beyond its core mandate, the Banco de España approved direct financial aid to students in affected municipalities and donated computing equipment to help reduce educational disruptions.</p>	Banco de España (2025)

29. Cyclone and floods in Tanzania (2023-2024)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	<p>Above average rains for two consecutive rain seasons of October-December 2023 (Vuli rains) and March-May 2024 (Masika rains), resulted in a series of floods, landslides, and debris-flows across all 26 regions of the country.</p> <p>On 3 December 2023 landslide from Mount Hanang in the Hanang district resulted in 94 fatalities and affecting more than 1,700 people.</p> <p>Following this, Tanzania experienced devastating floods in April 2024.</p> <p>While still responding to the floods, Cyclone Hidaya made landfall on May 4, 2024, bringing heavy rains, floods, and strong winds on Mafia Island and coastal regions of Tanzania. Cyclone Hidaya was the strongest ever cyclone to hit Tanzania, damaging four major bridges along the southern road corridor, temporarily cutting off two regions from the rest of the country for an extended period. The cyclone also disrupted marine transport services and fishing activities due to strong winds.</p>	World Bank Document – Eligibility note: Support for Tanzania
Date of occurrence for the event described in this survey	<p>The landslide was on 3 December 2023.</p> <p>Two consecutive rain seasons of October – December 2023 (Vuli rains) and March-May 2024 (Masika rains), which resulted in the December landslide, and May cyclone.</p> <p>On May 26, 2024, the Prime Minister declared a National State of Emergency.</p>	World Bank Document – Eligibility note: Support for Tanzania
Geographical scale of occurrence for the event	<p>Debris and mudflows from Mount Hanang impacted Katesh township and the nearby wards of Ganana, Jorodom, and the rural ward of Gendabi.</p> <p>Flooding triggered by Cyclone Hidaya damaged four major bridges along the southern road corridor, temporarily cutting off two regions from the rest of the country for an extended period. The cyclone also disrupted marine transport services and fishing activities due to strong winds.</p>	World Bank Document – Eligibility note: Support for Tanzania
Type of hazard for the event	Cyclone, Flood, debris and mudflows.	World Bank Document – Eligibility note: Support for Tanzania
Magnitude and length	No data available at public domain.	
Impact on population of the hazard	<p>El Niño-induced landslide flooding and Cyclone Hidaya caused 170 fatalities and 175 injuries, affecting over 220,000 people nationwide. The disasters damaged more than 10,000 buildings and severely disrupted critical infrastructure. Flooding affected national (trunk) road networks, damaging 1,904 road sections, 121 bridges, and 330 culverts and pipes.</p> <p>At the municipal level, impacts included damage to 63 bridges, 822 km of road sections, 84 km of major drains, and 225 culverts. In the agricultural sector, over 105,463 hectares of arable land were inundated, resulting in significant crop losses, particularly maize, paddy, and sesame. The flooding also affected 12 wards and 25 villages in Rufiji District, and 5 wards and 10 villages in Kibiti District.</p>	World Bank Document – Eligibility note: Support for Tanzania
Which and how economic agents were primarily affected	See above.	

Overview of how the economy in was affected, with a focus on most impacted sectors	Strong winds associated with Cyclone Hidaya damaged national grid infrastructure, leaving nearly 4.7 million people without electricity for at least four hours. Flooding triggered by the cyclone also damaged four major bridges along the southern road corridor, temporarily isolating two regions from the rest of the country for an extended period. In addition, the cyclone disrupted marine transport services and fishing activities due to hazardous sea conditions and high winds.	World Bank Document – Eligibility note: Support for Tanzania
Any other key characteristic deemed relevant	<p>Link between the event and climate change:</p> <p>The World Bank document links the 2023-2024 floods and landslides in Tanzania to climate variability driven by the El Niño phenomenon, which caused above-average rainfall over two consecutive rainy seasons (October-December 2023 and March-May 2024). These abnormal rainfall patterns directly triggered widespread flooding, landslides, and debris flows across all 26 regions of Tanzania.</p> <p>The combination of elevated rainfall, anomalies in rainfall patterns, and potentially unfavourable terrain characteristics may have contributed to devastated geo-hydrological disaster risk.</p>	<p>World Bank Document – Eligibility note: Support for Tanzania ;</p> <p>The Influence of Major Climatic Elements on the Devastated Geo-Hydrological Disasters: A Case of Hanang Disaster of 3rd December 2023 in Tanzania</p>

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	The disasters have had macroeconomic impacts, including lower than anticipated real GDP growth and additional fiscal pressure. In 2023, real GDP grew by 5.1 percent slightly lower than authorities' goal of 5.2 percent, partly due to climate related shocks that reduced production in agriculture sector and destroyed infrastructure, including bridges and roads. Moreover, real GDP growth projections for 2024 have been revised downwards from 5.6 percent to 5.4 percent due to slow implementation of structural reforms and floods related shocks, which destroyed bridges and road and slowed progress in implementation of new infrastructure projects especially during the first quarter of 2024. On the fiscal front, the cost of replacing bridges and roads is estimated at 0.6-0.8 percent of GDP in FY2024/25.	World Bank Document – Eligibility note: Support for Tanzania
	Inflation rate (in pp)		
	Unemployment rate (in pp)		
	Total import & export (gross or in %)		
	Others		
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors		
	Sectoral production for impacted sectors		
	Food price index		
	Insured and uninsured losses, in volume and in % of total losses		
Other relevant variables	The total disaster effects (damages and losses) from the impact of the 2023-2024 floods, landslides, and Cyclone Hidaya has been estimated at US\$ 553.08 million and immediate recovery needs are estimated at US\$ 630.21 million. The transportation, health and housing subsectors account for the largest proportion of disaster effects and recovery needs. The summary of the disaster effects and recovery needs is shown in the table in the reference document – World Bank.		

Contagion and international spillover effects observed following the event

Public measures taken to mitigate the impact of the disaster or boost the economic recovery

Other comments

3. FINANCIAL DISRUPTION

Impacts on the banking sector

No data available in the public domain.

Impacts on the insurance sector

NMB Bank and Reliance Insurance: NMB Bank, in partnership with its Bancassurance partner Reliance Insurance, compensated 18 small and medium entrepreneurs affected by the mudslide. The compensation was part of loan insurance, providing financial relief to those with insured loans.

Vision Fund and Metro Life Assurance: Vision Fund in collaboration with Metro Life Assurance cancelled debts for 22 million/- to small-scale business operators affected by the mudslide. This initiative aimed to alleviate the financial burden on the affected individuals.

NMB compensates entrepreneurs of mudslide victims in Hanang – Tanzania <https://www.africa-press.net/tanzania/all-news/nmb-compensates-entrepreneurs-of-mudslide-victims-in-hanang> ;

Microfinance cancels debts for Hanang mudslide victims ;

TIRA mobilises insurance companies in supporting Hanang mudslide survivors – Daily News ;

<https://dailynews.co.tz/tira-mobilises-insurance-companies-in-supporting-hanang-mudslide-survivors/>

Impacts on financial markets, at local or global scale

Impacts on public finances

Other comments

30. Drought in the United Kingdom (2022)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	2022 heatwave in the UK – the magnitude, extent and severity of the extreme heat events experienced over five ‘heat periods’ was unprecedented when compared with previous hot summers in the UK.	McCarthy (2022)
Date of occurrence for the event described in this survey	Five ‘heat periods’ (16-19 June, 10-25 July, 30 July-5 August, 8-17 August, 23-25 August).	
Geographical scale of occurrence for the event	National.	
Type of hazard for the event	Heatwave.	
Magnitude and length	40°+ heatwave for those five ‘heat periods’; it was the first time the UK’s Met Office issued a red ‘extreme heat’ warning (46 temperature monitoring stations across England breached previous temperature records).	Met Office
Impact on population of the hazard	During these five heat periods, 2,800+ excess deaths were recorded among those aged 65 years and over and 3,200+ excess deaths among all (excluding COVID-19 deaths): that was the highest excess mortality figure during heat periods recorded since the Heatwave Plan for England was introduced in 2004.	UKHSA (2022)
Which and how economic agents were primarily affected	Households, companies.	
Overview of how the economy in was affected, with a focus on most impacted sectors	<p>Health: during these heat events many hospitals and practices in the UK had to suspend or limit surgeries due to unsafe temperatures, being in older buildings with insufficient cooling. Extreme heat (days with temperatures above 30 °C) are estimated to increase NHS hospital admissions for a range of illnesses beyond heat stroke (in particular for metabolic and infectious diseases), with approximately 8,000 excess hospital admissions per year due to increased temperatures. With average day and night hospital admissions costing around £2,000 per person, these excess admissions alone could cost the NHS in the order of £16 million per year.</p> <p>Transport – During the July 2022 heatwave, physical deformation of key transportation infrastructure (e.g., railway lines, tarmac) led to temporary closures of several airports (including Luton) and speed restrictions along time-sensitive supply routes for ‘Just in Time’ components. Transport – example of Transport for London ; it is estimated that during the week of the July 2022 heatwave, TfL lost £8.4 million in revenue across their operations.</p> <p>Energy (Powerlines).</p> <p>Agriculture (see comment below on productivity).</p>	<p>Transport Focus (2022)</p> <p>London review EHB</p>
Any other key characteristic deemed relevant		

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact	GDP/Total GVA (gross or in %)	
	Inflation rate (in pp)	
	Unemployment rate (in pp)	
	Total import & export (gross or in %)	
	Others	Productivity – Over 11 million potential labour hours were lost in 2022 because of heat exposure across the agricultural, construction, manufacturing and service sectors. LSE
Quantitative estimates of the natural hazard's impact	Sectoral GVA for impacted sectors	
	Sectoral production for impacted sectors	
	Food price index	
	Insured and uninsured losses, in volume and in % of total losses	
	Other relevant variables	Supply chain disruptions as transport failed.
Contagion and international spillover effects observed following the event		
Public measures taken to mitigate the impact of the disaster or boost the economic recovery	Heat warning to raise awareness/reduce exposure.	
Other comments		

3. FINANCIAL DISRUPTION

Impacts on the banking sector	
Impacts on the insurance sector	
Impacts on financial markets, at local or global scale	
Impacts on public finances	
Other comments	

31. Drought in Zambia (2023-2024)

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Questions	Responses	Sources
1. EXTREME WEATHER EVENT		
General description of the event described in this survey	<p>During the 2023/2024 rainfall season, Zambia experienced the worst drought in the last 40 years, driven by the deficient rainfall in the wet season and higher temperatures. This affected 84 districts out of 116 districts across the country. The drought adversely affected crop production, pasture for livestock, power generation and the availability of both underground and surface water.</p> <p>The drought was declared a national disaster on 29 February 2024.</p> <p>9.8 million people were affected, with 6.6 million requiring immediate humanitarian assistance.</p> <p>Due to the dependency on hydropower for electricity, the drought resulted in severe electricity shortages. Electricity supply GVA fell 28.9% in 2024 (real), the single largest negative sectoral contribution. Load-shedding escalated through 2024; reports indicate 8-12 hours/day from Mar-May, and up to 21 hours/day by late-2024 in some areas.</p> <p>Agriculture's significant contribution to Zambia's gross domestic product (GDP) means that reduced agricultural output directly impacts economic growth, exacerbated food insecurity and inflation, prompting the government to impose export restrictions on maize and maize flour to manage domestic food supplies.</p>	<p>Suphachalasai, S. <i>et al.</i> (2025). Macro-Criticality of Water Resources. IMF Working Paper No. 2025/251. Washington D.C. Macro-Criticality of Water Resources ;</p> <p>OCHA. (2024). Zambia: Drought Response Appeal May 2024 – December 2024. United Nations Office for the Coordination of Humanitarian Affairs. https://www.unocha.org/publications/report/zambia/zambia-drought-response-appeal-may-2024-december-2024-issued-may-2024 ;</p> <p>https://en.wikipedia.org/wiki/2024_Zambian_drought</p>
Date of occurrence for the event described in this survey	The drought spanned the full 2023/2024 rainy season (Oct 2023-Apr/May 2024), with consequences persisting well into late 2024 due to crop failure, hydropower deficits, and food insecurity.	
Geographical scale of occurrence for the event	<p>A total of 84 out of 116-117 districts were drought-affected.</p> <p>Severely impacted provinces were: Southern Province, Western Province, Eastern Province, Central Province These four provinces account for over 58% of Zambia's maize production and over 76% of national livestock, making their vulnerability disproportionately high.</p>	
Type of hazard for the event	Drought.	
Magnitude and length	<p>Magnitude indicators:</p> <ul style="list-style-type: none"> • 2023/2024 was the worst drought in 40 years. • 40.46% of the country experiencing drought conditions in 2023-2024. • Average national rainfall from November 2023 to March 2024 was 35-45 percent below the 30-year mean (1991-2020), with conditions even more acute in the southern Agro-ecological Zone I, where precipitation dropped to less than half of typical levels. • Over the same period, temperatures ran 1.5-2.0 °C above the long-term norm, further exacerbating moisture stress and significantly amplifying the intensity of the drought. 	<p>[reliefweb.int] ;</p> <p>Assessing El Niño-induced drought in Zambia and its effects using earth observation data ;</p> <p>Mwape, A., <i>et al.</i> (2025) Drought Management in Zambia: Insights from the 2023/2024 Drought. Climate. 2025; 13(11), 227. Drought Management in Zambia: Insights from the 2023/2024 Drought</p>

Impact on population of the hazard	<p>9.8 million people were affected.</p> <p>Of these, 6.6 million required life-saving medical interventions and community-based primary health outreach; 3.5 million needed access to safe drinking water, water for livestock, and irrigation; and 1.3 million required supplementary feeding to prevent severe and acute malnutrition. In addition, 2.4 million school-aged children in affected districts lacked safe drinking water and school meals amid the drought.</p>	<p>[reliefweb.int] ;</p> <p>International Monetary Fund. (2024). <i>Zambia: Third Review Under the Arrangement Under the Extended Credit Facility, Requests for Augmentation of Access, Modifications of the Monetary Policy Consultation Clause and of Quantitative Performance Criteria, and Financing Assurances Review – Press Release; Staff Report; and Statement by the Executive Director for Zambia</i> (IMF Country Report No. 24/190). International Monetary Fund. https://www.imf.org/-/media/files/publications/cr/2024/english/1zmbea2024001-print-pdf.pdf ;</p> <p>DMMU. (2024) Drought Response Situation Report. DMMU. (https://reliefweb.int/attachments/4bb244a6-d13d-4181-b97f-692231e19eda/Final%20Situation%20Report%202_30.08.2024.pdf)</p>
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Which and how economic agents were primarily affected

Summary Table: Economic Agents & Key Impacts

Economic Agent	How They Were Affected (Evidence-Based)
Smallholder farmers	Crop failures (982,765 ha lost), 53% drop in grain production, food insecurity, livelihood collapse.
Agribusinesses	Reduced supply of crops, lower demand for inputs, disrupted supply chains.
Energy sector	Reservoir depletion, hydropower shortages, 21-hour load shedding affecting 80% of population.
Mining companies	Lower copper production due to power shortages. GDP projection cut from 4.7% to 2.3%.
Urban businesses (SMEs & large firms)	Production downtime, higher operating costs from generators.
Financial institutions	Higher loan defaults; disruption of rural finance ecosystems.
Government	Increased relief spending, food imports, infrastructure rehabilitation.
General consumers	Higher food prices, widespread food shortages, severe load shedding.

Households were severely affected by the sharp rise in inflation, driven primarily by the failure of nearly 70 percent of the maize crop. With the inflation rate averaging 15 percent in 2024, up from 11 percent in both 2022 and 2023, household purchasing power eroded substantially, making staple foods increasingly unaffordable for low-income families (IMF 2024; Suphachalasai *et al.*, 2025).

Households reported adopting stress livelihood coping strategies such as borrowing money (50 percent), purchasing food on credit (48 percent), consuming seed stocks meant for the next season (30 percent) and spending savings (30 percent) indicating reduced ability to deal with future shocks. Western Province had the highest proportion of households adopting stress livelihood coping strategies (Food and Agriculture Organization, 2024).

Some households adopted crisis livelihood coping strategies such as reducing expenditure on health (27 percent), selling household goods (20 percent) and selling productive assets (16 percent), directly reducing future productivity. (Food and Agriculture Organization, 2024).

Households also employed emergency coping strategies, which are more difficult to reverse, such as selling last female animals/livestock (23 percent) and selling a house/land (3 percent). The majority of households employing emergency coping strategies were reported in Southern Province. (Food and Agriculture Organization, 2024).

Companies, especially those dependent on reliable electricity, also experienced major disruptions as power outages became more frequent and prolonged. Zambia generates roughly 80 percent of its electricity from hydropower plants at Lake Kariba and Kafue Gorge, and the sharp decline in water levels during the 2023/ 2024 drought reduced output at Kariba by around 80 percent. Load-shedding reached up to 20 hours per day in major urban centers such as Lusaka. These outages curtailed production, increased operating costs, and significantly constrained business activity. (IMF 2025 b).

Financial institutions were indirectly affected through heightened credit risk, as firms facing reduced output and higher input costs became more vulnerable to repayment difficulties. The private sector credit growth rate decelerated from 17.8% to 9% in 2024 (IMF 2025 a).

[unocha.org];

[fsdzambia.org] [acaps.org];

[reliefweb.int];

IMF. (2024). Zambia: Staff Report for the Fourth Review under the Extended Credit Facility (ECF) Arrangement and Financing Assurances Review. IMF, Washington D.C. ;

Suphachalasai, S. *et al.* (2025). Macro-Criticality of Water Resources. IMF Working Paper No. 2025/251. Washington D.C. [Macro-Criticality of Water Resources](#) ;

Food and Agriculture Organization of the United Nations. (2024, July 20). *Impact of El Niño-induced drought on food security and livelihoods of vulnerable communities in Zambia* (FAO). FAO Open Knowledge Repository. <https://openknowledge.fao.org/server/api/core/bitstreams/33eb0849-1345-4587-9b9c-abda6fff1382/content> ;

IMF. (2025 a). Zambia: Staff Report for the 2025 Article IV Consultation and Fifth Review Under the Extended Credit Facility Arrangement and Financing Assurances Review. IMF, Washington D.C. ;

IMF. (2025 b). Zambia: Selected Issues, IMF Staff Country Reports 2025/ 242 (2025). Washington D.C. [Zambia: Selected Issues](#)

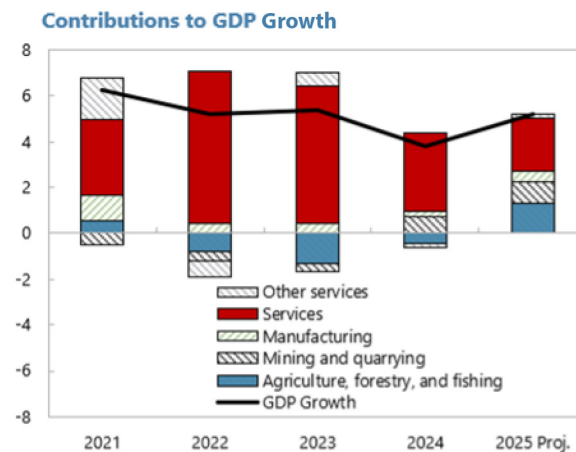
<p>Overview of how the economy was affected, with a focus on most impacted sectors</p>	<p>Economic disruption was most severe in the first half of 2024, with conditions improving in late 2024 as disaster-intervention measures were implemented and rainfall normalized. The agriculture and electricity-generation sectors suffered the sharpest declines: agriculture contracted by 20.6 percent year-on-year due to widespread crop failure – later moderating to -9.2 percent for the full year – while electricity generation fell 9.6 percent in early 2024 and deteriorated further to -29 percent year-on-year, reflecting critically low hydropower output and extensive load-shedding (IMF 2024; IMF 2025 b).</p> <p>The drought and associated power shortages also weighed on broader economic activity. Growth in non-mining, non-agricultural sectors slowed markedly, decelerating from 7.7 percent in 2023 H1 to 3.5 percent in 2024 H1, as firms faced reduced operating hours, higher input costs, and production disruptions tied to energy shortages (IMF 2024).</p>	<p>[reliefweb.int] ;</p> <p>IMF. (2024). Zambia: Staff Report for the Fourth Review under the Extended Credit Facility (ECF) Arrangement and Financing Assurances Review. IMF, Washington D.C. ;</p> <p>IMF. (2025 a). Zambia: Staff Report for the 2025 Article IV Consultation and Fifth Review Under the Extended Credit Facility Arrangement and Financing Assurances Review. IMF, Washington D.C. ;</p> <p>IMF. (2025 b). Zambia: Selected Issues, IMF Staff Country Reports 2025/242 (2025). Washington D.C. Zambia: Selected Issues</p>
<p>Any other key characteristic deemed relevant</p>	<p>Link between this event and climate change:</p> <p>Multiple authoritative assessments describe the 2023/24 drought as one of the most severe in Zambia’s recorded history, clearly linked to climate-related drivers:</p> <ul style="list-style-type: none"> • The 2023/24 season was the driest agricultural season in more than forty years, characterized by <i>late rainfall onset, prolonged dry spells, and abnormally high temperatures</i>. • The drought was El Niño-induced, which is a climate-sensitive phenomenon that has become more extreme in a warming climate. • Zambia is highly vulnerable to climate variability because of its dependence on rain-fed agriculture and hydropower, creating stronger climate-related impacts during drought years. <p>These patterns are consistent with broader climate-change science, where warming increases the likelihood of hotter and drier rainy seasons, intensifies evapotranspiration, and exacerbates agricultural and hydrological droughts.</p> <p>1.2 Increasing Frequency and Intensity of Droughts.</p> <p>Zambia has experienced more frequent and intense droughts in recent decades:</p> <ul style="list-style-type: none"> • Scientific analysis notes that Zambia continues to face increasingly frequent and intense droughts, with 2023/24 among the most severe. • Severe droughts documented in historical records include 1969-1977, 1979-1987, 1991-92, 2015-16, 2019-20, and 2024, indicating a rising pattern of repeated events. • The 2024 drought affected 84 out of 116 districts, signalling an unprecedented spatial scale and severity driven by climate-related factors. <p>Although these sources show a clear upward trend, they do not quantify it in percentages.</p>	

2. ECONOMIC DISRUPTION

Quantitative estimates of the natural hazard's impact

GDP/Total GVA (gross or in %)

Economic activities were heavily affected by the drought, with the most severe disruption occurring in 2024 H1. Real GDP growth slowed sharply to 1.9% in 2024 H1, before rebounding in the second half of the year and closing at an estimated 3.8% for the full year.



The recovery in late 2024 was driven primarily by services, which more than offset the contraction in drought-affected sectors (IMF 2024; IMF 2025 b).

The drought's earliest and most destructive impacts were concentrated in agriculture and electricity generation, which together account for a significant share of GDP.

- Agriculture contracted by 20.6% year-on-year in 2024 H1, reflecting widespread crop failure and severe water shortages. Although conditions improved slightly later in the season, supported by late rainfall and emergency government interventions, the sector is still estimated to have contracted 9.2% for the full year.
- Electricity output fell 9.6% y/y in 2024 H1, as the Kariba Dam operated at less than 10% of normal capacity, resulting in extensive load-shedding. Mining companies were forced to double their reliance on imported electricity, which reached roughly 40% of their total power consumption.

In contrast, mining and quarrying expanded by 8.8% in 2024, supported by prioritized electricity allocation to mining operations and the use of imported diesel and power to maintain production levels. Copper output accelerated from mid-2024 onward, helping lift GDP in extractives and boosting export earnings (IMF 2025a).

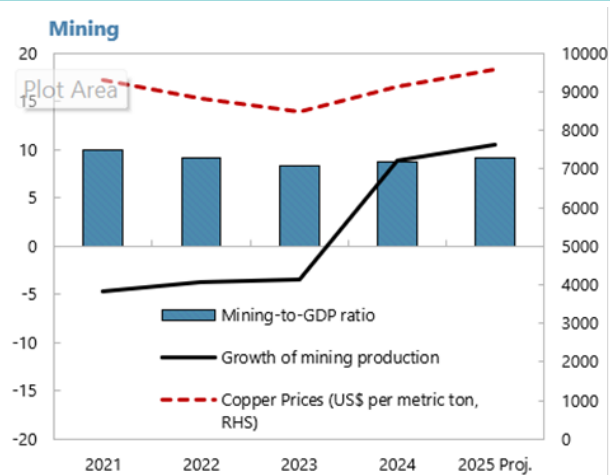
[acaps.org];

[unocha.org];

IMF. (2024). Zambia: Staff Report for the Fourth Review under the Extended Credit Facility (ECF) Arrangement and Financing Assurances Review. IMF, Washington D.C.

IMF. (2025 b). Zambia: Selected Issues, IMF Staff Country Reports 2025/242 (2025). Washington D.C. [Zambia: Selected Issues](#)

Quantitative estimates of the natural hazard's impact



The services sector, particularly information and communication, financial services, and wholesale-retail trade, emerged as the main driver of the late-year rebound. Services alone contributed 3.5 percentage points to the 4 percent GDP growth, as electricity supply to productive sectors improved in the second half of the year (IMF 2025a).

Inflation rate (in pp)

Inflation reached 15.5% in August 2024, the highest since Dec 2021.

- Food prices increased 17.6%.
- This reflects a sharp upward trend driven by drought-related supply shortages.

Inflation rose from 15.7% in October 2024 to 16.5% in November 2024 due to drought-induced import and energy pressures.

Estimated Overall Drought Impact: 17 consecutive months of rising inflation.

A conservative estimate is that the drought contributed at least +1-2 percentage points to annual inflation (in addition to normal inflation drivers), though official decompositions are not published.

The effects of the drought have caused inflationary pressure. The annual food inflation rate has been in double-digits and rising throughout 2024, reaching 17.4 percent in July, amid the downturn in local food production, while the effects of a weak currency have further exacerbated fuel price growth. Nominal prices of maize grain reached record highs in March 2024, and despite dipping seasonally in subsequent months, began to rise again in July (FAO, 2024).

[reliefweb.int] ;

[equityaxis.net] ;

[Zambia: El Niño impact assessment highlights, July 2024](#) ;

Suphachalasai, S. *et al.* (2025). Macro-Criticality of Water Resources. IMF Working Paper No. 2025/251. Washington D.C. [Macro-Criticality of Water Resources](#)

ZamStat. [Annual Overall Inflation, December 2024 \(%\) – Zambia Statistics Agency](#)

Quantitative estimates of the natural hazard's impact

Unemployment rate (in pp)

At the household level, quarterly labor market data indicated some strain. The slight improvements recorded in 2022-23 gave way to rising unemployment and declining formal employment in 2024. The employment rate (% of working-age population, 15 years+) was 63.7% in 2022 and only 57.1% in 2024. (World Bank, 2025).

The overall unemployment rate on the World Bank databank in 2024 was 5.9 percent, similar to the 2023 and 2022 indicators.



Total import & export (gross or in %)

Total imports of goods and services increased by 10 percent in 2024. By category, fuel and energy imports rose by 32 percent relative to 2023, accounting for 55 percent of the overall increase in imports. Imports of crops and electricity grew by 144 percent and 27 percent, contributing 8 percent and 27 percent, respectively, to the total import expansion. (UN Comtrade).

Exports: Copper exports declined due to reduced electricity supply: Power shortages reduced copper production.

While export volume changes (%) are not published, reduced mining output implies a measurable but unquantified decline in export earnings.

UN Comtrade Database.
UN Comtrade accessed 01/30/2025

[reliefweb.int];

[equityaxis.net];

[acaps.org];

[equityaxis.net]

Quantitative estimates of the natural hazard's impact

Others

Interest Rates: In August, the BoZ kept the policy rate at 13.5 percent, citing the drought's impact, earlier cumulative rate hikes totaling 250 bps, higher reserve requirements set in February, and relative Kwacha stability (IMF 2024). Then in November 2024 the policy rate was increased to 14 percent. (Bank of Zambia, 2024).

[thedocs.worldbank.org];

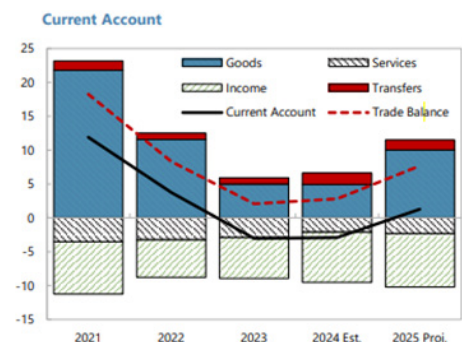
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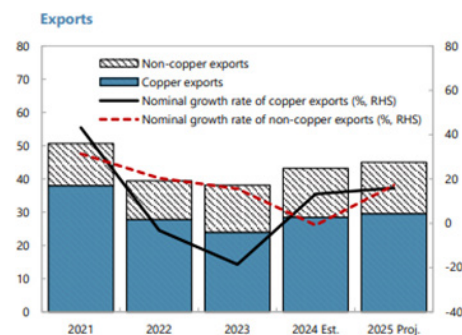
[acaps.org];

[reliefweb.int]

CA: The current account deficit narrowed in 2024, supported by increased grants and stronger tourism receipts:



Trade Balance: Copper and gold exports increased, particularly toward the end of the year, but were offset by higher oil and electricity imports amid power shortages:

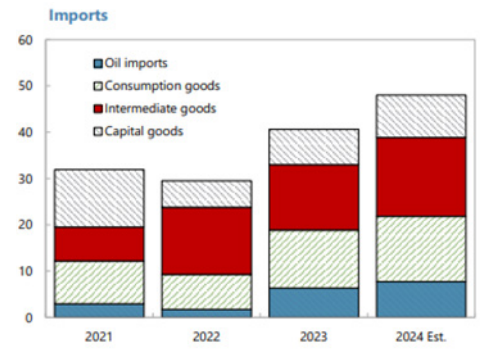


International Monetary Fund. (2024). *Zambia: Fourth review under the extended credit facility – Article A002* (IMF Country Report No. 24/350, Article A002). IMF. <https://www.elibrary.imf.org/downloadpdf/view/journals/002/2024/350/article-A002-en.pdf>

Bank of Zambia. (2024, November). *Monetary policy report: November 2024*. <https://www.boz.zm/November2024MonetaryPolicyReport.pdf>

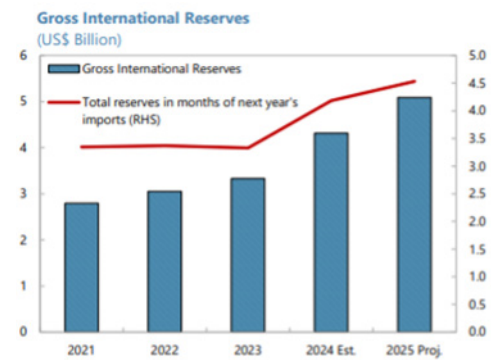
International Monetary Fund (2025). *Zambia: 2025 Article IV consultation, fifth review under the extended credit facility arrangement, and financing assurances review – Press release; staff report; and statement by the executive director for Zambia* (IMF Country Report No. 25/225). IMF. https://www.imf.org/-/media/files/publications/cr/2025/english/1zmbca2025001_source-pdf.pdf

Quantitative estimates of the natural hazard's impact



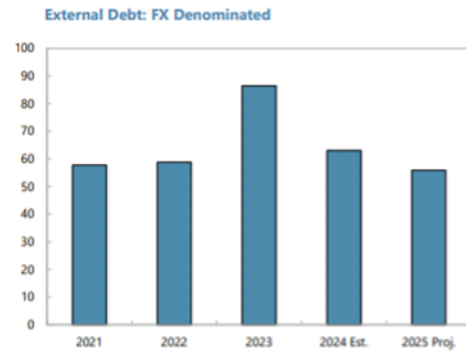
International Monetary Fund. (2024). *Zambia: Fourth review under the extended credit facility – Article A002* (IMF Country Report No. 24/350, Article A002). IMF.

FX: Reserves increased, supported by increased FX statutory reserve requirement and multilateral financing:



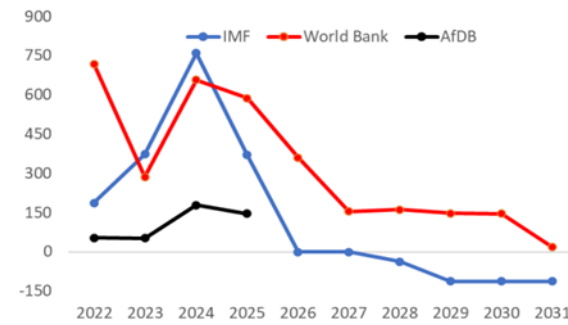
Quantitative estimates of the natural hazard's impact

External debt remained at elevated levels.



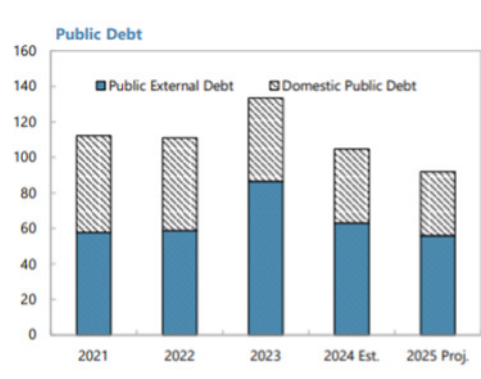
Net Financing from IFIs increased:

Text Figure 3. Zambia: Net Financing from IFIs, 2022–31
(US\$ million)



Quantitative estimates of the natural hazard's impact

Public debt increased in 2023 and then came down:



Quantitative estimates of the natural hazard's impact

Sectoral GVA for impacted sectors

Sector	2023 GVA (bn, 2010 ZMW)	2024 GVA (bn, 2010 ZMW)	Δ (bn)	2024 growth (%)
Agriculture, forestry & fishing	7.882	7.155	-0.727	-9.2
Electricity supply	2.868	2.040	-0.828	-28.9
Water supply	0.389	0.341	-0.048	-12.2
Manufacturing (context)	14.440	14.777	+0.337	+2.3

Interpretation: In real terms, agriculture and power saw substantial declines in 2024; water also fell. Manufacturing as a whole grew modestly, but food & beverages sub-segments faced raw-material constraints and power interruptions in 2024 (see production and prices below)

IMF. (2025 a). Zambia: Staff Report for the 2025 Article IV Consultation and Fifth Review Under the Extended Credit Facility Arrangement and Financing Assurances Review. IMF, Washington D.C.

Quantitative estimates of the natural hazard's impact

Sectoral production for impacted sectors

Crop	Prior season (MT)	2023/24 (MT)	Δ (MT)	Change (%)
Maize (grain)	3,261,686	1,511,143	-1,750,543	-53.7%
Soya beans	760,067	169,700	-590,367	-78%
Cassava (roots)	4,500,000	3,127,778	-1,372,222	-30%
Wheat	277,492	198,886	-78,606	-28%
Sunflower	91,607	44,128	-47,479	-52%
Irish potatoes	65,082	34,153	-30,929	-47%
Rice (paddy)	62,680	24,566	-38,114	-61%
Millet	46,753	15,390	-31,363	-67%
Sorghum	6,836	2,865	-3,971	-58%

OCHA. (2025). Zambia: Drought Response Appeal May 2024 – June 2025. United Nations Office for the Coordination of Humanitarian Affairs. [Zambia: Revised Drought Flash Appeal – May 2024 – June 2025 \(Revision December 2024\)](#) | OCHA

ERB. 2024. Energy Sector Report 2024. Energy Regulation Board. Lusaka, Zambia. [esr2024.pdf](#)

Food price index

Comparing Sep-2024 to Sep-2023 yields:

- Breakfast meal: +23.9% y/y.
- Roller meal: +29.6% y/y.
- Maize grain (20 L): +39.9% y/y.
- Simple index (equal-weighted average): +29.1% y/y.
All price points are taken from ZamStats monthly releases.

FAO also notes national maize prices hit record highs in early-2025 before easing as 2025 production rebounded.

Headline inflation reached 15.7% in Oct-2024, driven in part by food prices and power shortages; BoZ flagged food and energy as key drivers through mid-2024.

Data from Zambia Statistical Agency (ZamStats), Food and Agricultural Organisation (FAO)

<p>Quantitative estimates of the natural hazard's impact</p>	<p>Insured and uninsured losses, in volume and in % of total losses</p>	<p>With over 2 million hectares of maize lost during the drought, it can be estimated that the monetary loss is 737 million. (Taron & Ghosh, 2024).</p> <p>The Government of Zambia, through the Ministry of Community Development and Social Services, secured an insurance payout of K108,125,423 from ZSIC General Insurance Limited. This financial relief package was set to benefit 63,270 small-scale farmers under the Food Security Pack (FSP) programme, whose crops were devastated during the 2023/24 farming season. (The Agency Media, 2024).</p> <p>The African Risk Capacity (ARC) Group made a climate risk insurance payout to the Government of the Republic of Zambia amounting to US\$9,979,140 following severe drought conditions during the 2023/2024 agricultural season to support communities' recovery from food insecurity and loss of livelihoods. (African Risk Capacity Group, 2024).</p> <p>The Farmer Input Support Programme (FISP), saw a payout of over 800 million kwacha to over 500,071 smallholder farmers who faced climate-related losses during the 2023/2024 farming season. (Pula Advisors, 2024).</p> <p>What's the denominator?</p> <ul style="list-style-type: none"> • Government/UN financing needs for drought relief & early recovery were first estimated at US\$941m (Apr-2024 FSDRP) and later revised to ~US\$1.4 bn (Aug-2024 SitRep). These are <i>response</i> needs (not full economic damage). <p>Implied insured share of total losses/needs:</p> <ul style="list-style-type: none"> • ~3.4%-5.7% of the relief/early-recovery envelope was covered by insurance payouts. (<i>Computation using Python; workbook shows both bounds</i>). <p>Caveat: These are payouts, not ultimate economic damages. Broader welfare and output losses (production, power, incomes) are larger than the insured layer, which primarily covered targeted relief to vulnerable households and smallholders.</p>	<p>ARC ;</p> <p>Zambia Statistics ;</p> <p>Bank of Zambia ;</p> <p>Taron, A., & Ghosh, S. (2024, November 28). <i>Climate finance for resilience is a necessity to counter the ongoing drought in Zambia</i>. PreventionWeb. https://www.preventionweb.net/news/climate-finance-resilience-necessity-counter-ongoing-drought-zambia</p> <p>The Agency Media. (2024, June 12). <i>The Government of Zambia secures K108 million insurance payout to support drought-affected farmers. THE GOVERNMENT OF ZAMBIA SECURES K108 MILLION INSURANCE PAYOUT TO SUPPORT DROUGHT-AFFECTED FARMERS – The Agency Media</i></p> <p>African Risk Capacity Group. (2024, June 10). <i>ARC Group makes US\$133 million climate insurance payouts to Government of the Republic of Zambia and World Food Programme. The ARC Group makes US\$13.3 million climate insurance payouts to the Government of the Republic of Zambia and the World Food Programme to assist people affected from drought African Risk Capacity Group</i></p> <p>Pula Advisors. (2024). <i>Zambia's largest crop index insurance payout marks historic milestone for smallholder farmers</i>. Pula Advisors. https://www.pula-advisors.com/post/zambia-s-largest-crop-index-insurance-payout-marks-historic-milestone-for-smallholder-farmer</p>
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Quantitative estimates of the natural hazard's impact	Other relevant variables	<p>Power system: H1-2024 national electricity generation fell ~14.5% y/y as major hydro plants curtailed output (Kafue Gorge & KGL particularly). In national accounts, Electricity supply GVA fell 28.9% in 2024 (real), the single largest negative sectoral contribution. Load-shedding escalated through 2024; reports indicate 8-12 hours/day from Mar-May, and up to 21 hours/day by late-2024 in some areas as Lake Kariba levels hit historic lows for the time of year.</p> <ul style="list-style-type: none"> • Food security: 5.8 million people were assessed food insecure during the 2024/25 consumption year; IPC projected up to 5.6 million in IPC3 (Crisis) and 236k in IPC4 (Emergency) at the lean season peak. • Trade & balance sheet implications: FAO GIEWS estimated 0.75-1.0 million MT maize imports in 2024/25 after a drought-hit harvest, with prices at record highs in early-2025 before easing. • Macro updates: The IMF revised 2024 real GDP growth down to ~1.2% in late 2024 owing to electricity shortfalls and agriculture contraction, though ZamStats' preliminary <i>annual</i> estimate later posted +4.0% for 2024 (different vintages/methods). Inflation peaked near 16.7% late 2024; BoZ flagged food/energy pressures in 2024 owing to electricity shortfalls and agriculture contraction. 	
Contagion and international spillover effects observed following the event	<ul style="list-style-type: none"> • 53.6% decline in grain production (maize fell from 3.26 Mt to 1.75 Mt). • Total crop failure on ~982,765 ha, with affected provinces accounting for 58% of national maize production. • Severe food insecurity, with over 5.8 million people food-insecure during 2024-2025. <p>This shock significantly disrupted Zambia's agriculture, energy sector, and fiscal/external balances – forming the basis for regional and international spillovers.</p> <p>The severe net maize shortfall (about 1.3 million metric tons) forced Zambia to import maize, a staple food crop, to meet domestic food demand. This shift from domestic supply to imports strained logistics and added pressure to trade and food distribution systems. (World Bank, 2025).</p> <p>Power shortages disrupted supply chains in manufacturing and other productive sectors dependent on reliable electricity. Frequent blackouts curtailed industrial productivity and increased production costs, creating bottlenecks in supply chains for goods beyond agriculture (e.g., processed foods, manufactured products). (Suphachalalai, S. <i>et al</i>, 2025).</p> <p>Regional Spillovers:</p> <ul style="list-style-type: none"> • Reduced Zambian supply increases regional import demand, contributing to Southern Africa's grain market tightening. • Food-insecure populations rise regionally, consistent with OCHA's Southern Africa humanitarian snapshots. <p>The 2023/24 drought in Zambia exhibits clear contagion effects (inflation, energy shocks, production losses, migration) and international spillovers (regional food shortages, trade distortions, hydropower disruptions, humanitarian pressures).</p>	<p>https://www.unocha.org/publications/report/zambia/zambia-revised-drought-flash-appeal-may-2024-june-2025-revision-issued-december-2024 ; [reliefweb.int] ;</p> <p>World Bank. (2025). <i>Zambia economic update: Leveraging energy transition minerals for economic transformation – Economic growth outlook and sectoral challenges</i> (Zambia Economic Update Series). World Bank.</p> <p>https://documents1.worldbank.org/curated/en/099062725095023804/pdf/P507170-f1945747-24af-4b28-9cd0-697e4db7b237.pdf</p> <p>Suphachalalai, S. <i>et al</i>. (2025). <i>Macro-Criticality of Water Resources</i>. IMF Working Paper No. 2025/251. Washington D.C. Macro-Criticality of Water Resources</p>	

Public measures taken to mitigate the impact of the disaster or boost the economic recovery	<p>The authorities implemented a broad set of fiscal, social, and financial-sector measures to mitigate the impact of the drought and support economic recovery.</p> <p>To alleviate energy shortages, the government raised electricity tariffs and, in November 2024, suspended the implementation of previously approved multi-year tariff adjustments to enable the importation of 788 megawatts of electricity. It also refrained from introducing any new tax expenditures on maize imports. (BoZ 2024a; IMF 2025a)</p> <p>The 2024 budget was revised to finance a comprehensive drought-response package totaling K8.3 billion. Key measures included:</p> <ul style="list-style-type: none"> • A total of K5.2 billion has been allocated to the Ministry of Community Development and Social Services to strengthen the Social Cash Transfer Program, enabling a K200 top-up for all 1.3 million beneficiary households, thereby ensuring that each household receives K400 per month during this critical period. • To further mitigate the socioeconomic impact of the drought, the Government introduced a Cash for Work Program, spending K0.7 billion to provide temporary job to vulnerable individuals. • To sustain school attendance and protect human capital development, the Government has expanded the School Feeding Program from early childhood education to secondary education across 37 severely affected districts, supported by an additional K392.2 million, supplementing the previously approved K111.7 million for 2024. • To address acute water scarcity, K306.6 million has been earmarked for the rehabilitation and maintenance of dams in 84 affected districts, the drilling of high-capacity boreholes, and the provision of essential water-treatment chemicals to key utility providers. • Within the livestock and wildlife sectors, the Government allocated an additional K460 million to enhance disease surveillance, vaccination efforts, and control measures, given the heightened vulnerability of livestock to drought-related diseases. • The Disaster Management and Mitigation Unit (DMMU) coordinated the humanitarian in-kind support to provide food in remote areas, distributing MT41 thousands of maize as of January 2025 (National Assembly of Zambia 2024). <p>To support financial stability amid drought-related pressures, the Bank of Zambia launched the Stability and Resilience Facility (SRF) in December 2024. The Facility provides funding to eligible Financial Service Providers (FSPs) for onward lending to viable businesses in agriculture and sectors adversely affected by electricity shortages. Under the SRF, loans are offered at concessional terms – 100 basis points below the policy rate for conventional loans and 300 basis points below the policy rate for green loans – with maturities of up to seven years. As of end-May 2025, the Bank of Zambia had approved K1.7 billion of applications out of K4.8 billion submitted (IMF 2025a).</p>	<p>IMF. (2025 a). Zambia: Staff Report for the 2025 Article IV Consultation and Fifth Review Under the Extended Credit Facility Arrangement and Financing Assurances Review. IMF, Washington D.C.</p> <p>National Assembly of Zambia. 2024. Minister of Finance proposes K41.9 billion supplementary budget. Minister of Finance proposes K41.9 billion supplementary budget National Assembly of Zambia</p> <p>BoZ. 2024a. Monetary Policy Report. Bank of Zambia. Lusaka, Zambia. November2024Monetary PolicyReport.pdf</p>
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Other comments	<p>1. Coordination With International Agencies.</p> <p>a. Flash Appeals and Resource Mobilization.</p> <ul style="list-style-type: none"> • The government collaborated with OCHA and partners through a Revised Drought Flash Appeal (May 2024-June 2025) to mobilize humanitarian resources for food, agriculture, health, and water programs. <p>b. Regional and Global Climate Relief Engagement.</p> <p>The drought formed part of the Southern Africa El Niño crisis response, enabling Zambia to access coordinated regional support systems for food imports, disaster financing, and technical guidance.</p> <p>2. Macroeconomic and Business Continuity Measures.</p> <p>a. Adjusted Economic Growth Outlook and Sector-Specific Interventions.</p> <ul style="list-style-type: none"> • The drought severely affected copper production and electricity supply, prompting the government to coordinate with key industries and development partners to protect priority industrial operations amidst reduced power availability. <p>b. Social Protection and Livelihood Restoration.</p> <p>Humanitarian partners and the government expanded cash transfers, food distributions, and targeted community support programmes in highly affected districts.</p>
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3. FINANCIAL DISRUPTION

Impacts on the banking sector	<p>The 2023/24 drought placed significant stress on Zambia’s banking sector, mainly through inflation, electricity shortages, agricultural losses, and exchange-rate volatility. These conditions weakened credit quality, increased liquidity needs, and prompted the Bank of Zambia to launch a substantial K5 billion stabilization facility to support financial institutions and mitigate systemic risk.</p> <p>BoZ’s establishment of the Stability and Resilience Facility (SRF) underscores the presence of systemic risks emerging from the drought:</p> <ul style="list-style-type: none"> • pressure on balance sheets, • increased borrower distress, • potential for rising non-performing loans, • exchange-rate – linked credit deterioration. <p>The central bank explicitly stated that the drought’s combined food production shock and energy crisis posed financial stability concerns.</p>	<p>https://www.zambiamonitor.com/bank-of-zambia-launches-stability-resilience-facility-to-bolster-financial-sector-amid-drought-impact/ ;</p> <p>IMF. (2025 b). Zambia: Selected Issues, IMF Staff Country Reports 2025/ 242 (2025). Washington D.C. Zambia: Selected Issues</p> <p>BoZ. 2024a. Monetary Policy Report. Bank of Zambia. Lusaka, Zambia. November2024Monetary PolicyReport.pdf</p>
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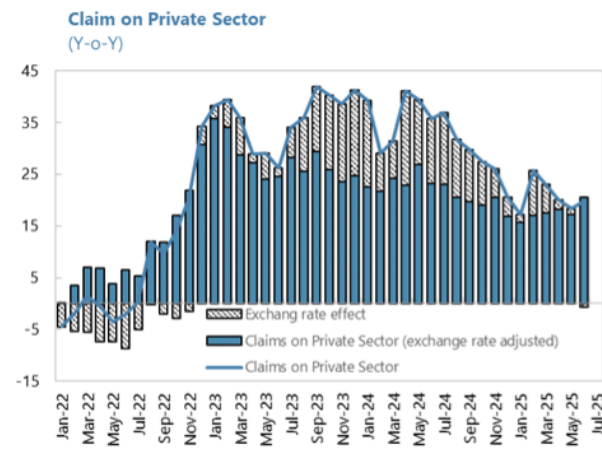
Impacts on the banking sector

The drought contributed to macroeconomic instability – particularly inflationary pressures and exchangerate volatility – which in turn weakened the credit quality of banks’ loan portfolios. The Bank of Zambia noted an increasing share of foreign-currency – denominated loans on commercial banks’ balance sheets, heightening exchange-rate risk and weakening overall credit quality.

Drought-induced losses in agriculture, energy-intensive industries, and small businesses reduced borrowers’ repayment capacity, increasing vulnerability to loan defaults – particularly among Micro, Small and Medium Enterprises (MSMEs) dependent on agriculture or stable electricity supplies. This is implicitly reflected in the Bank of Zambia’s concern about credit quality deterioration under drought-driven economic stress.

Effects of Electricity Shortages on Banking Infrastructure: Prolonged load shedding (linked to drought-driven declines in hydropower generation) disrupted banking operations, particularly in: branch activities, ATM network reliability, digital payments requiring stable power, and operational costs (increased reliance on generators or backup power).

Private sector credit growth weakened significantly, slowing to 9 percent in 2024, down from 17.8 percent in 2023. This deceleration reflects heightened economic uncertainty and drought-related disruptions to production, with particularly pronounced slowdowns in manufacturing, energy, and trade (IMF 2025b).



<p>Impacts on the banking sector</p>	<p>The Statutory reserve ratio was increased to 26 percent in February, a 9 percentage point rise, as the Bank of Zambia responded to elevated inflationary pressures. (Note: this increase occurred on February 2nd, before a state of emergency was declared. However, rainfall had already been below normal since November 2023). These inflation pressures were partly driven by strong foreign exchange demand associated with drought-induced import needs, including maize and electricity, which intensified liquidity pressures and contributed to the tightening of monetary conditions (BoZ 2025).- percentage-point rise, as the Bank of Zambia responded to elevated inflationary pressures. These inflation pressures were partly driven by strong foreign-exchange demand associated with drought-induced import needs, including maize and electricity, which intensified liquidity pressures and contributed to the tightening of monetary conditions.</p> <p>Sector-Specific Impact on Agricultural Finance.</p> <p>a. Increased Vulnerability of Agricultural Loan Portfolios.</p> <p>Agriculture was among the worst-hit sectors, with crop failures and widespread livelihood losses, meaning agricultural borrowers became increasingly high-risk. This is reflected in the eligibility focus of the SRF, which prioritizes lending to agriculture-linked MSMEs to cushion these shocks.</p> <p>b. Greater Demand for Concessional or Targeted Credit.</p> <p>Financial institutions required central-bank-provided liquidity to sustain lending without elevating interest rates or reducing credit to drought-affected clients.</p>	
<p>Impacts on the insurance sector</p>	<p>The 2023/24 drought resulted in widespread, simultaneous claims. This placed increased financial pressure on insurers due to high payout volumes triggered by index-based policies. While available reports do not quantify the financial burden, the scale of crop loss implies substantial exposure for insurers.</p> <p>The 2023/24 drought significantly tested the resilience of Zambia’s insurance sector, particularly within agricultural micro-insurance markets. Key impacts included:</p> <ul style="list-style-type: none"> • A sharp increase in weather-related claims from farmers under Weather Index Insurance. • Operational strains, marked by delays and challenges in claims processing. • Erosion of trust due to compensation delays and inadequate communication. • Financial pressures on insurers faced with high, simultaneous payout obligations. • A reinforced need for improved technologies, capacity strengthening, and more robust climate-risk management frameworks. <p>The severe and prolonged rainfall deficits of the 2023/24 season triggered a sharp rise in expected insurance payouts for farmers enrolled in Weather Index Insurance (WII) schemes. Farmers in Southern Province and other affected areas awaited clarification and compensation from insurers as adverse weather conditions met the thresholds for payouts under WII arrangements.</p> <p>The Centre for Environment Justice (CEJ) reported mounting farmer concerns regarding delays in insurance compensation. Many farmers under the Farmer Input Support Programme (FISP) had contributed premium payments (K100 per farmer), demonstrating reliance on the insurance system as a safety net during climate shocks.</p> <p>Delays and Bottlenecks in Claims Processing: The drought caused widespread and simultaneous crop losses across thousands of farmers, overwhelming insurers’ operational capacities. CEJ highlighted concerns about slow, non-transparent compensation processes, indicating systemic strain within insurance operations during climate-induced disasters.</p> <p>Insurers were urged to adopt more efficient technologies, such as remote sensing, to accelerate damage assessments and payouts. CEJ recommended capacity building for rapid response and dedicated claims-handling teams to deal with peak-period weather-related losses.</p>	<p>[cejzambia.org]</p>

Impacts on financial markets, at local or global scale

- Zambia’s GDP growth estimate for 2024 was cut from 2.3% to 1.2%, with the central bank attributing the slowdown to drought induced food shortages and electricity deficits. Actual GDP growth was 4% in 2024, representing a 1.6 percentage point year-on-year decline-induced food shortages and electricity deficits.

Macroeconomic instability of this nature typically depresses investor sentiment, raises country risk premiums, and increases the volatility of financial assets. While the stock market impact has not been quantified yet, equity markets in drought-hit, commodity-dependent economies typically experienced capital outflows, lower valuations, and widening spreads under similar conditions.

3. Currency Market Pressures & Exchange-Rate Risks.

3.1 Increased Share of FX-Denominated Loans.

The central bank highlighted growing exposure to foreign-currency denominated loans, which weakened credit quality due to heightened exchange-rate risks.

- This reflects increased demand for FX borrowing, likely prompted by currency volatility and inflation.

The presence of a targeted liquidity facility (SRF) strongly suggests authorities acted *precisely to prevent* firesale spirals.

<https://www.pwc.com/zm/en/publications/zambia-economic-review.html> ;

<https://reliefweb.int/updates?list=Zambia%3A%20Drought%20-%202024-2025%20Updates%20%28Maps%20/%20Infographics%29&view=maps&advanced-search=%28D51911%29>

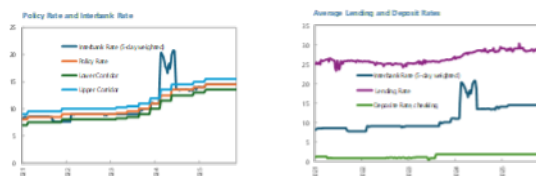
Impacts on public finances

Drought conditions placed substantial pressure on public finances, with approximately 20 percent of the national budget redirected toward drought-related interventions. As a result, primary spending fell from 21.9 percent of GDP in 2023 to 19.2 percent in 2024 (IMF 2025b). To close the financing gap, the authorities reallocated expenditures, mobilized additional domestic revenues, and secured increased support from multilateral and bilateral partners – including a 30-percent-of-quota augmentation under the IMF’s ECF arrangement approved in June 2024 – which collectively helped alleviate pressures on both the fiscal framework and external financing needs. (IMF 2025a).

On the external side, the current account deficit narrowed only marginally – by 0.4 percentage points relative to 2023. (IMF 2025a) Although higher copper and gold exports in the second half of the year provided some relief, these gains were offset by a sharp increase in imports of maize, electricity, and petroleum products driven by drought-related shortages. USDA estimates maize import needs at roughly 1 million metric tons. Electricity imports surged from 294 GWh in 2023 to 2467 GWh in 2024, while imports of refined petroleum products rose by 25.2 percent. (ESR 2024; IEA).

IMF. (2025 b). Zambia: Selected Issues, IMF Staff Country Reports 2025/ 242 (2025). Washington D.C. [Zambia: Selected Issues](#)

USDA. 2024. Zambia Depends on Corn Imports to Maintain Food Security. Report No. ZA20240001. USDA Foreign Agricultural Service. Washington D.C. [DownloadReportByFileName-0001](#). USDA Foreign Agricultural Service



IMF. (2025 a). Zambia: Staff Report for the 2025 Article IV Consultation and Fifth Review Under the Extended Credit Facility Arrangement and Financing Assurances Review. IMF, Washington D.C.

The inflation was sharply pushed upward through higher food prices and drought-induced currency depreciation, compelling the BoZ increased the policy rate by a cumulative 300 basis points in 2024 and added another 50 basis points in February 2025, bringing the rate to 14.5 percent (IMF 2025a). At the same time, the drought generated acute liquidity shortages in the first half of 2024. Rapid increases in maize and electricity imports, combined with weaker export receipts, created foreign-exchange shortages and drained kwacha liquidity from the banking system. Interbank overnight lending rates rose well above the policy rate as banks relied heavily on the overnight facility, particularly while open-market operations were suspended. Though, it is important to note, the interbank rate started rising on 2/9/2024, around the same time the policy rate was increased by 150 bps (it went from 11.02 on 2/2/2024 to 15.03 on 2/9/2024). Food inflation (makes up 53% in total inflation) spiked sharply in March, but in January and February 2024 it was still moving at about the same pace as in 2023. Therefore the increase of rates could be more tied to the earlier inflation pressures rather than the drought.

Impacts on public finances

In the 2024 H2, liquidity conditions later improved and interbank rates gradually converged toward the policy rate (IMF 2025a). However, despite this normalization in the overnight market, lending rates remained persistently high. Continued drought-related credit risks in agriculture and electricity-dependent sectors, heightened uncertainty, and structural weaknesses in monetary transmission kept borrowing costs elevated. As a result, even though interbank conditions realigned with the policy stance after mid-2024, the broader passthrough of monetary policy to lending conditions remained impaired. This underscores the depth and persistence of the drought's impact on Zambia's financial system-related credit risks in agriculture and electricity-dependent sectors, heightened uncertainty, and structural weaknesses in monetary transmission. In 2024, the broader passthrough of monetary policy to lending conditions remained impaired. This underscores the depth and persistence of the drought's impact on Zambia's financial system.

Other comments
