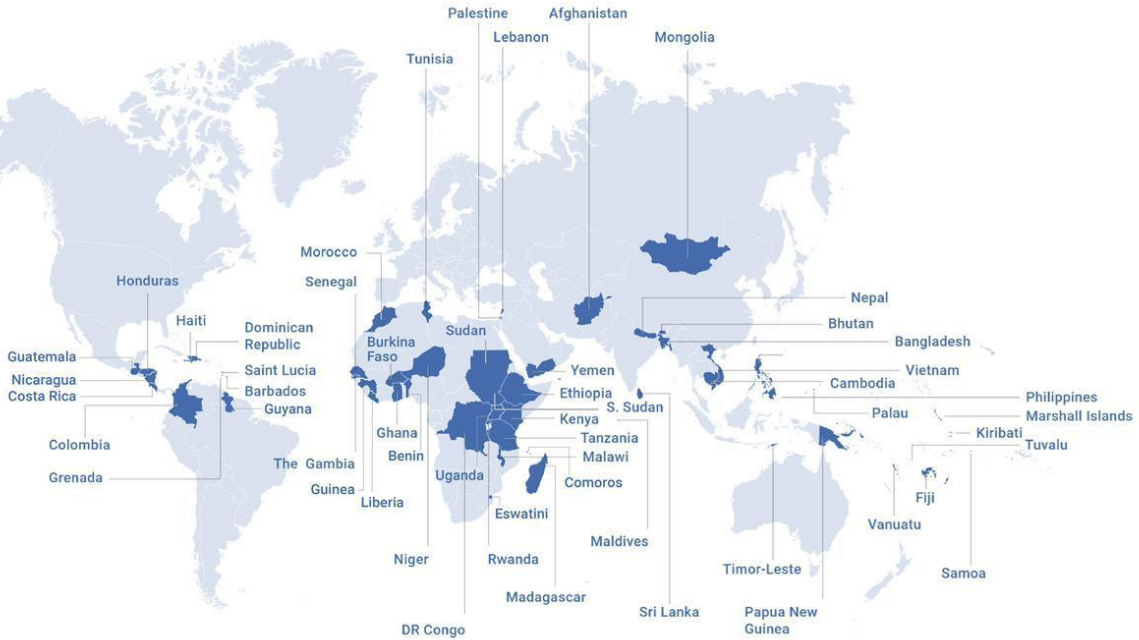
Climate Vulnerability Monitor (CVM)

Introduction to the Climate Vulnerable Forum (CVF) and the Vulnerable Group of Twenty (V20)

Founding of the CVF: Male', Maldives, November 2009

CVF established V20 to translate the political agenda into financing and real economy progress in October 2015 in Lima, Peru



Current CVF/V20 Chair

Ghana
2022 to present

Bangladesh
2020 to 2022

Marshall Islands
2018 to 2020

Troika

CVF & V20 members from 58 developing countries

GLOBAL CENTER ON ADAPTATION

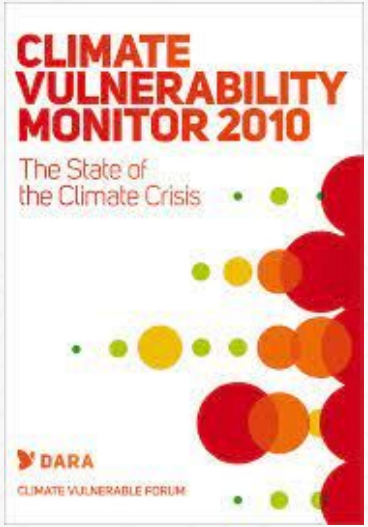
The **Global Center on Adaptation (GCA)** is an international organization working as a solutions broker to accelerate action and support for adaptation solutions, from the international to the local, in partnership with the public and private sector, to ensure we learn from each other and work together for a climate resilient future.

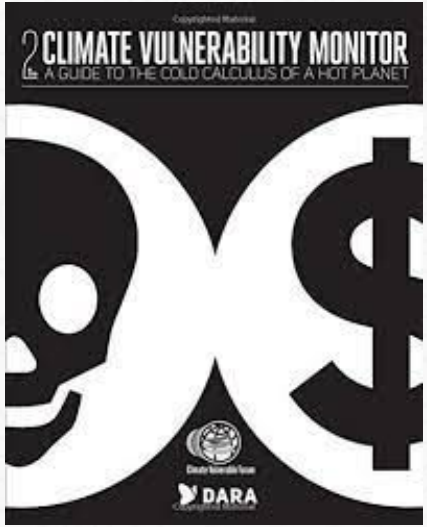
The GCA is the Managing Partner and host of the secretariat of the Climate Vulnerable Forum (CVF) and Vulnerable Twenty Group (V20).

Climate Vulnerability Monitor Series

In partnership with

CLIMATE ANALYTICS





The CVM represents a **unique global knowledge product and tool for responses to global climate change** - at international, regional and national levels - providing

1. Explicit quantified information as estimates for the total impact of climate change in economic
2. Public health and ecological terms
3. Formulating practical policy recommendations

= promote more effective responses to the threats of climate change which variously and disproportionately affect certain populations, communities and economies.

The Climate Vulnerability Monitor, Third Edition (CVM3)

- The CVM3 is a unique global assessment at the national level of present and potential future climate change impacts on the environment, economy and public health.
- The Monitor consolidates the latest research from the scientific literature on the attribution of climate change in 32 distinct indicators of socioeconomic and environmental change and impact phenomena.

Knowledge Partners

- **Research Consortium** - a mandated group of leading scientific organizations forms a highly competent interdisciplinary consortium managing the project and forming the research team for the CVM3
- **Contact Groups** - relevant stakeholders involved in policy and program formulation, implementation or investments who participate in the development stages of the CVM3 via voluntary and representative “Contact Groups”
- **Regional Partners/Expert Reviewers** - 1-2 Think Tanks from 12 regions
- **Publication Partners** - institutions that will lead CVM3 publication in peer-reviewed journals and book for mainstream and academic audiences.

Brief Background on CVM3 Methodology

Research Consortium

Global Center on Adaptation (GCA) and the Climate Vulnerable Forum (CVF) and the Vulnerable Group of Twenty V20): Research Consortium Lead

- Overall Coordination
- Editorial Leadership for the CVM3 Report

Biophysical and Socio-economic Impact Analysis Scientific Consortium

- Climate Analytics, Lead
- Global Data Lab
- Mercator Climate Change Institute
- Climate Media Factory

Human Health Impact Analysis

- The Lancet Countdown

Macro-economic Impact Analysis

- Finres

Biophysical Indicators

Temperature
Daily maximum near-surface air temperature
Daily minimum near-surface air temperature
Daily mean near-surface air temperature
Water
Precipitation (rainfall+snowfall)
Snowfall
Surface runoff
Discharge
Maximum daily discharge
Minimum daily discharge
Drought Index
Extreme precipitation
Wind
Horizontal wind speed
Agriculture
Total soil moisture content
Maize yields
Rice yields (first growing period)
Rice yields (second growing period)
Soy yields
Winter wheat yields
Spring wheat yields (summer wheat)

Health Indicators

Heat and Health
Exposure of vulnerable populations to heatwaves
Heat and physical activity
Loss of labor productivity
Heat-related mortality
Wildfires
Exposure to very high or extremely high wildfire risk
Infectious Diseases
Dengue
Vibrio
Malaria
Heat and Food Security
Crop yield potential
Heat and food insecurity

Economic Indicators

GDP Per Capita Growth
Inflation
Interest Rates

Baseline: (1995–2014)

	Near-term, 2021-2040	Mid-term, 2041-2060	Long-term, 2081-2100
Scenario	Best Estimate in C° (Very likely range)	Best Estimate in C° (Very likely range)	Best Estimate in C° (Very likely range)
SSP1-1.9	1.5 (1.2 to 1.7)	1.6 (1.2 to 2.0)	1.4 (1.0 to 1.8)
SSP1-2.6	1.5 (1.2 to 1.8)	1.7 (1.3 to 2.2)	1.8 (1.3 to 2.4)
SSP2-4.5	1.5 (1.2 to 1.8)	2.0 (1.6 to 2.5)	2.7 (2.1 to 3.5)
SSP3-7.0	1.5 (1.2 to 1.8)	2.1 (1.7 to 2.6)	3.6 (2.8 to 4.6)
SSP5-8.5	1.6 (1.3 to 1.9)	2.4 (1.9 to 3.0)	4.4 (3.3 to 5.7)

Table 1: Changes in global surface temperature, which are assessed based on multiple lines of evidence, for selected 20-year time periods and the five illustrative emissions scenarios considered. Temperature differences relative to the average global surface temperature of the period 1850–1900 are reported in °C. For further details, see AR6 WG1 SPM and chapter 4. Source: IPCC, 2022

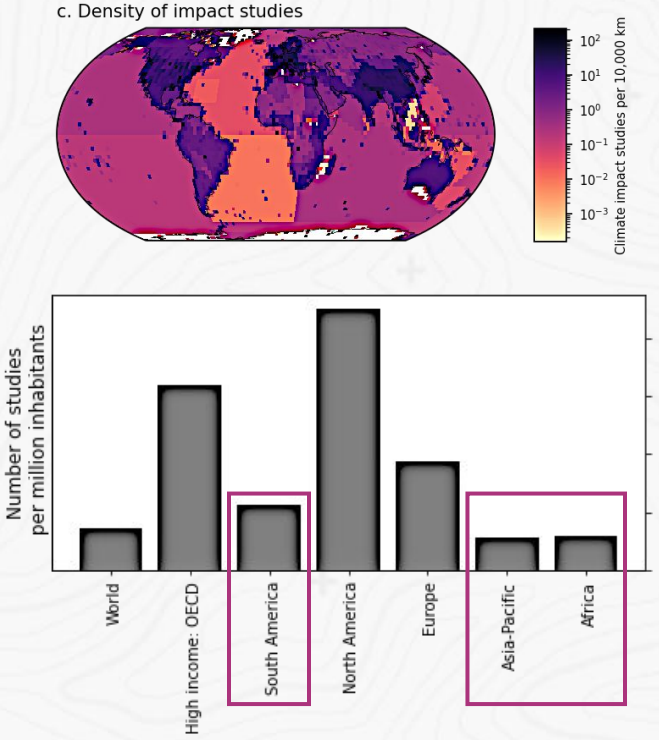
CVM3 Key Findings

BIOPHYSICAL AND SOCIO-ECONOMIC IMPACTS

CLIMATE ANALYTICS

Climate change impacts are observed across the world

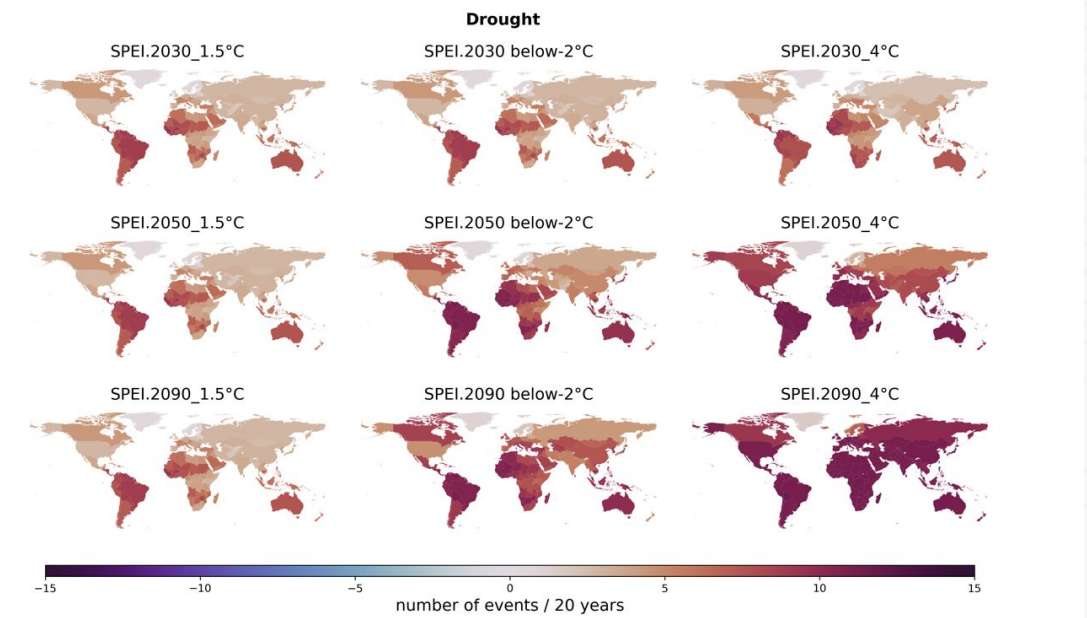
- Current warming of around 1.1°C is already leading to severe documented losses and damages across the world
- Currently, **85% of the global population** live in areas that are experiencing significant change in temperature and precipitation that is attributable to climate change.
- Large amount of scientific literature on observed impacts of climate change and growing quickly
- Despite the large amount of scientific literature, the **most vulnerable regions have much less visibility** in documented impacts.



Source: CVM3, 2022

Climate impacts increase with every fraction of warming

- Global warming, under all scenarios, causes negative impacts to natural and human systems:
  - Increased **temperatures**
  - More **droughts**
  - Lower mean precipitation
  - More **extreme rain events** in several regions
  - Decreased **major crop production** in already vulnerable regions.



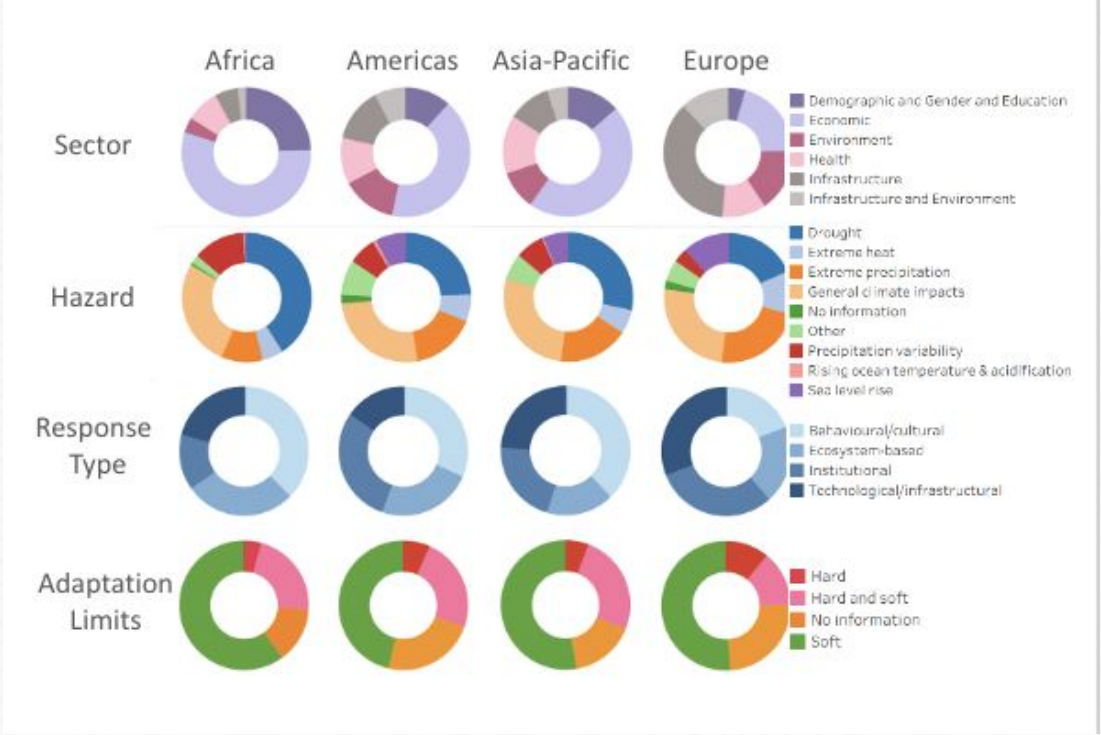
Limiting warming to 1.5°C will minimise negative impacts

Impacts by 2100	Drought events (per 20yrs)	Flood	Crop Yields (wheat)
Impacts at 1.5° C	4 to 8 fold increase	4 to 8% increase	0 to +3%
Below 2° Scenario (SSP 1-2.6)	8 to 12 fold increase	3 to 8% increase	-1% to +4%
No climate action scenario (SSP 3-7.0)	12 to 14 fold increase	4 to 22% increase	-15% to +6%

- Climate change will cause changes in biophysical conditions and have impacts across sectors
- The range of projections is quite wide, particularly for a high emission scenario for every continent and also for several countries
- Limiting warming to 1.5°C reduces the potential impacts substantially, and provides more clarity for planning responses.

Adaptation and adaptation support are essential

- Progress is being made in adaptation planning and implementation globally
- Focus on economic and technological sectors, and less in education, health, and environmental sectors.
- The effectiveness of our adaptation efforts is crucially dependent on mitigation: adaptation limits increase for human and natural systems at higher levels of warming.
- Adaptation, even when effective, does not prevent all losses and damages.



Source: CVM3, 2022

Key takeaways

- Current warming of around **1.1°C is already leading to severe documented impacts** across the world and negative impacts of climate change are observed across natural and human systems
- The **1.5°C temperature limit is critical**, also to spur improved socioeconomic conditions and to achieve the United Nation's Sustainable Development Goals.
- Above 1.5°C vulnerable countries and communities will reach the limits of what they are able to adapt to – there is therefore no amount of adaptation efforts that can make up for delayed efforts to reduce emissions in this critical decade for climate action.
- **Adaptation and adaptation finance are essential to reduce climate risks**, even at present day levels.
- The effectiveness of our adaptation efforts will be dependent on the limits will be faced at higher levels of climate risk.
- **Adaptation, even when effective, does not prevent all losses and damages.**

CLIMATE CHANGE AND HEALTH

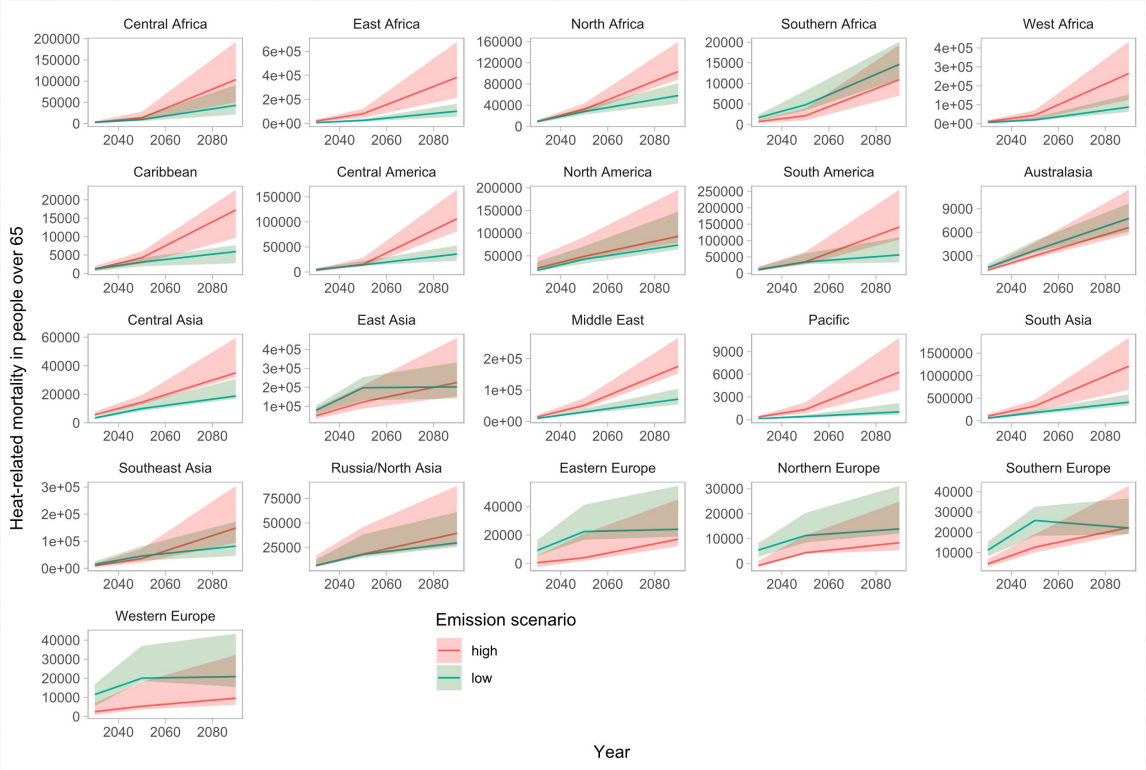
Heat and Health

Heat-related mortality

Without further adaptation, heat-related mortality is expected raise by **1550%**, to over **3 million annual deaths** under no climate action scenario by 2090. **91%** of these deaths would be avoided by limiting warming to **1.5°C,** compared with only **56%** avoided if temperatures rise to just below **2°C**.

The South Asia sub-region is expected to be most affected. India alone would see **1 million** additional heat-related deaths by 2090 without global climate action.

Change in heat-related mortality in people over 65 years of age with respect to the 1995-2014 baseline



Climate Change and Infectious Diseases

Risk of Dengue Transmission

In a no-climate-action scenario, **26** more countries around the world would experience conditions suitable for dengue outbreaks by the end of the century, with a global increase in environmental suitability of **~30%.** The European Mediterranean (including Greece, Italy and Spain) is at high risk of re-emergence of the disease.

However, the number of countries becoming newly suitable for dengue transmission is projected to fall to just **6** more countries if global mean temperature rise is limited to 1.5°C (**~10%** increase in environmental suitability)

Future changes in the potential for Dengue transmission by *A. aegypti* (represented as R0)

1.5°C-compatible scenario

<2°C-compatible scenario, 2090

No climate action scenario, 2090

Climate-sensitive Extreme Events and Health

Exposure to wildfire danger

Human exposure to days of very high or extremely high wildfire danger is projected to increase by **34% with respect to the recent past,** if no climate action is taken. This increase could be limited to **12.3%** by keeping temperatures below 2°C, and reduced further to 8.5% under a 1.5°C-compatible scenario

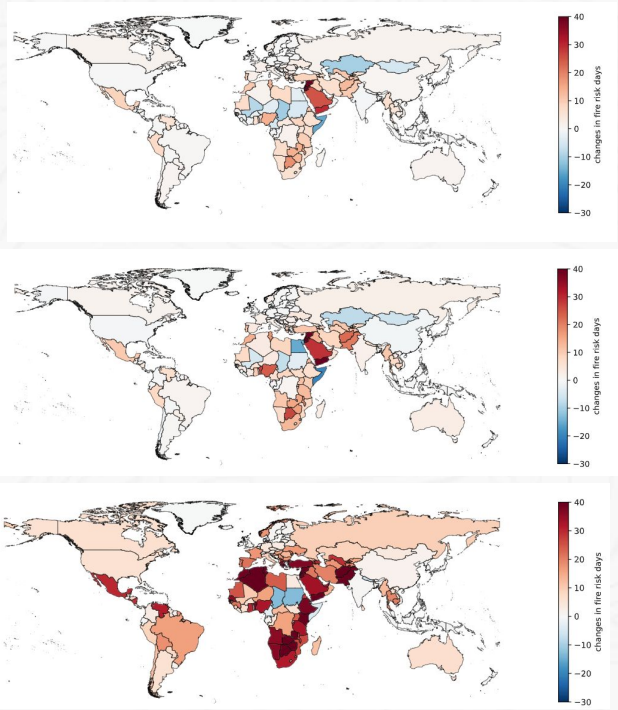
With no climate action, exposure to very high wildfire risk is projected to increase by the end of the century in the Middle East by 74 days, or **250%,** and by 65 days, or **500%** in Southern Africa, with respect to the recent past.

Population-weighted mean changes in extremely high and very high fire danger days for 2021-2040 period

1.5°C-compatible scenario

<2°C-compatible scenario, 2090

No climate action scenario, 2090



Climate Change and Food Insecurity

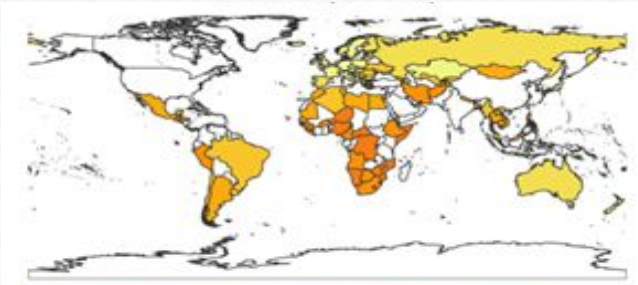
Heat and food insecurity

If no climate action is taken, the increase in heatwave events will result in an increase in moderate or severe food insecurity of **12.8 percentage-points** globally towards the end of the century, against just **1.9** percentage increase under a scenario compatible with 2°C of heating.

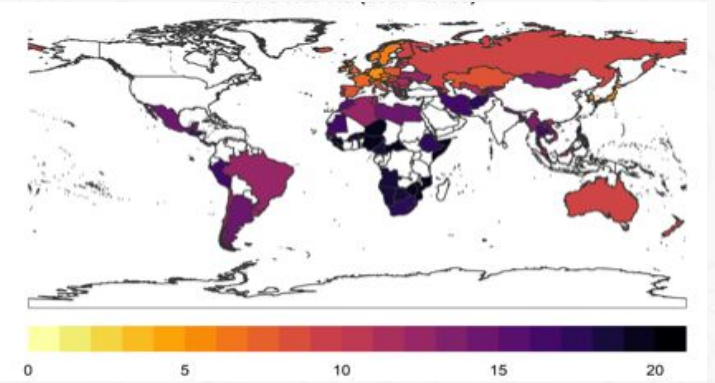
The highest increases in climate-attributable food insecurity are projected to be in Sierra Leone, Liberia, Central African Republic, and Somalia, all low HDI countries that already face high levels of food insecurity today.

Percentage point change in moderate-severe food insecurity due to change in heatwave days with respect to 1995-2014

1.5°C-compatible scenario



No climate action scenario, 2090



LANCET COUNTDOWN:
TRACKING PROGRESS ON
HEALTH AND CLIMATE CHANGE

Climate-driven health risks will increase in all future scenarios. Increased adaptation is essential to preserve human health and wellbeing

Exacerbated health impacts will be felt in all countries, but the most vulnerable will be the most affected, unless urgent action is taken to promote a just transition

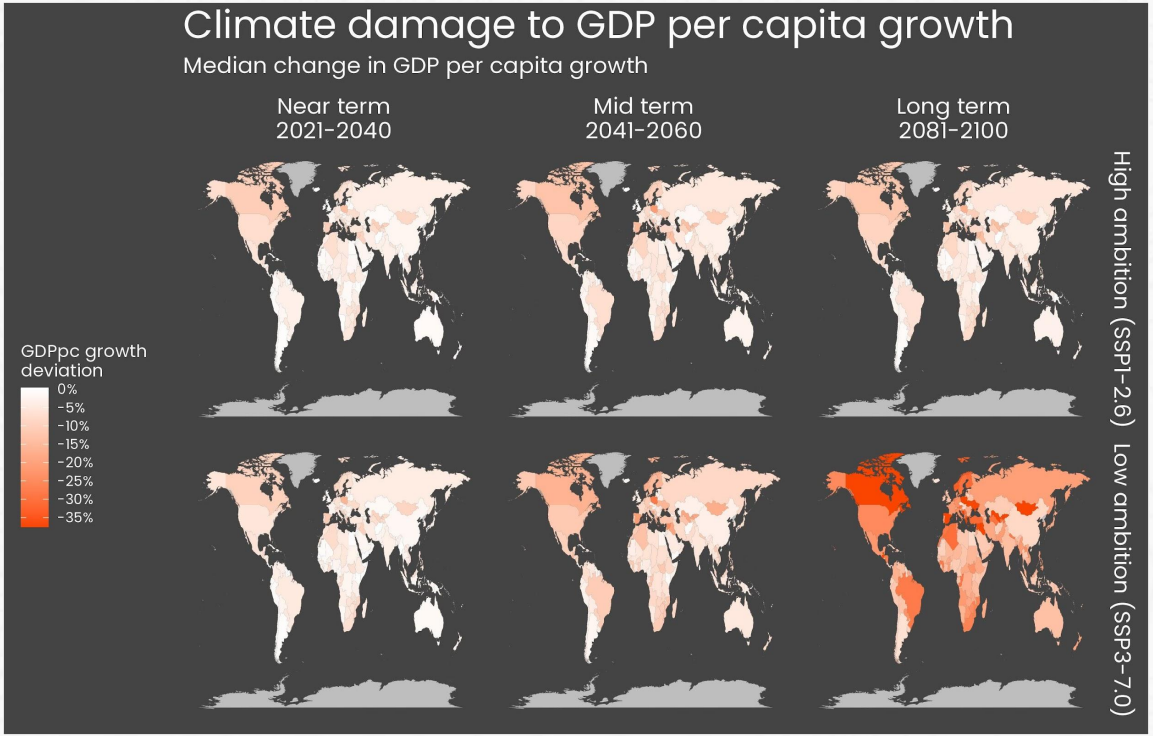
Accelerated climate action today can prevent catastrophic health impacts in the near, medium and long-term

MACROECONOMIC CONSEQUENCES OF CLIMATE CHANGE

FINRES

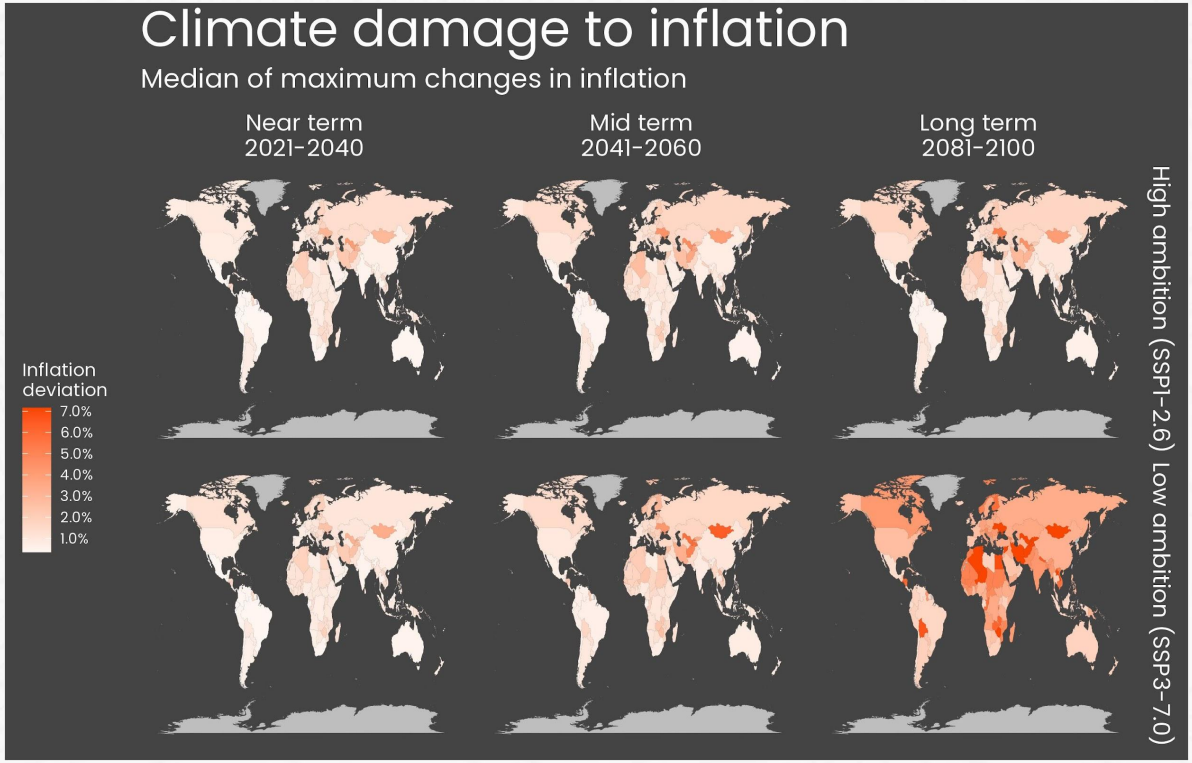
Results: GDP per capita

- By mid-century, median damage of climate change on GDP per capita ranging from close to null to -35% deviation from baseline growth
- Eastern Europe, Central Asia among most affected regions
- Higher development outcomes expected under a high ambition scenario



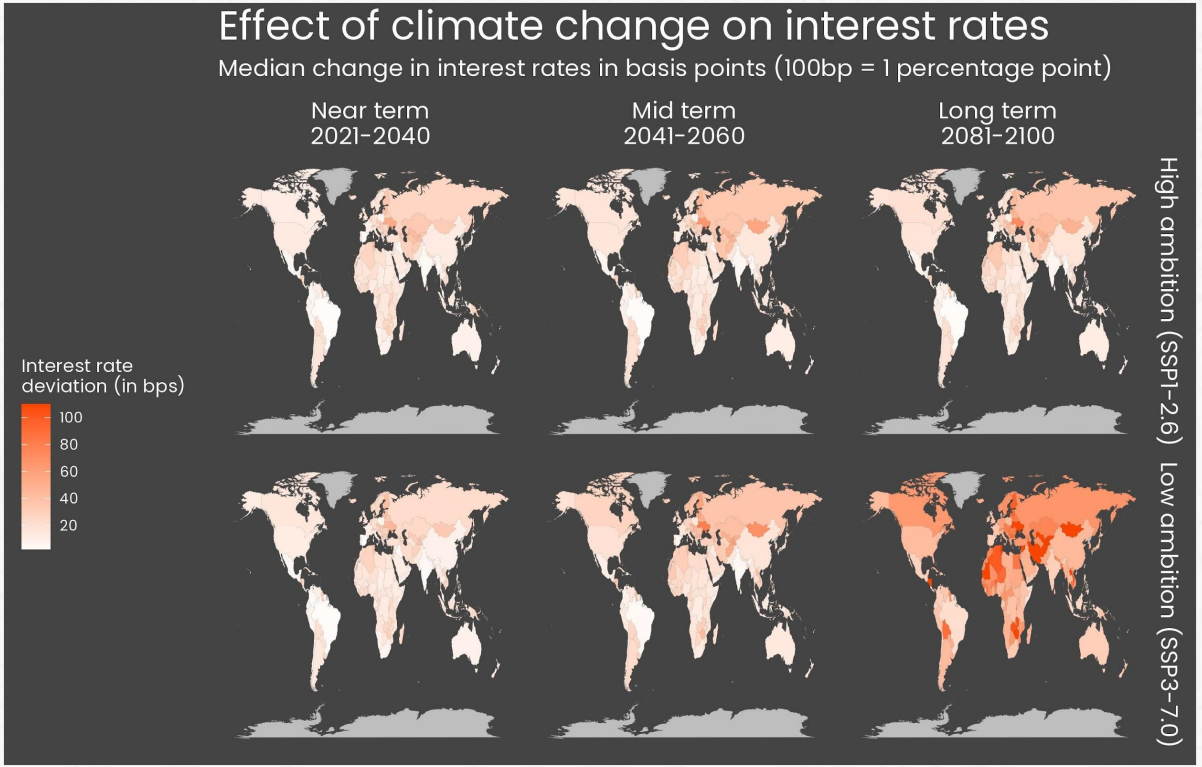
Results: Inflation

- Median effects of climate change on inflation ranging from close to 1% to 7% change
- Central Asia, Western Africa and Northern Africa among most affected regions
- Ambitious emission reduction is the best insurance against climate-driven inflation



Results: interest rates

- Median effects of climate change on interest rates ranging from close to null to 100 basis points deviation (up to 200bps in Central Asia)
- Central Asia, Western Africa and Northern Africa among most affected regions
- High ambition scenario mitigates most impacts on interest rates



Key Takeaways

- From low- to high-income countries, there will be increased macroeconomic consequences from climate change
- Northern economies not immune to negative consequences of climate change: benefits from agricultural productivity will not compensate losses from other sectors
- For all indicators, all countries, keeping global mean temperature below 1.5°C is the best policy against catastrophic loss and damage

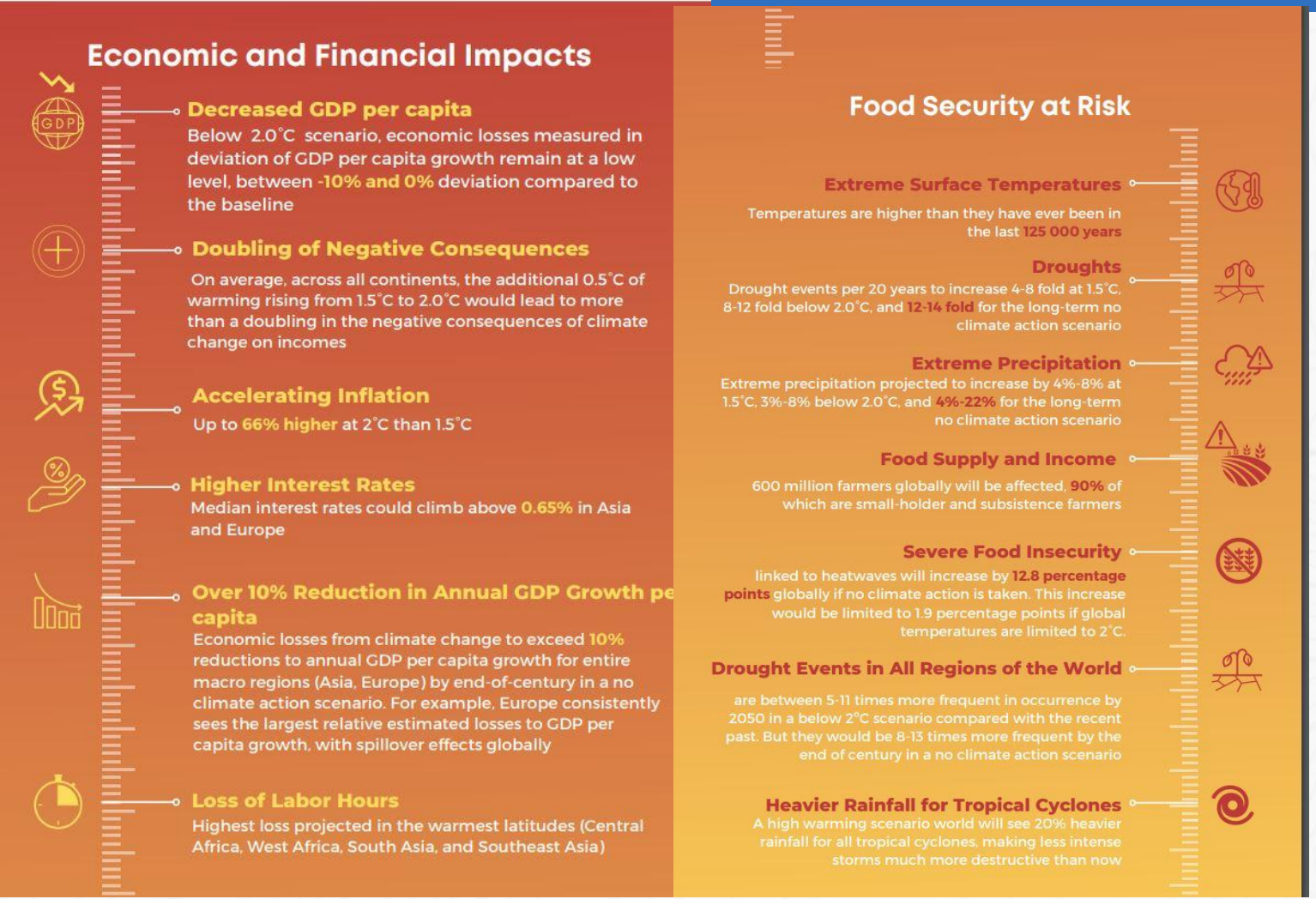
BOTTOM LINE

The main finding of this report is that climate change impacts generate loss and damage that are creating crises for society, human health and development globally. The asymmetric impact of climate change deepens global inequalities and injustice, though nobody is spared. In the near-term, the world should brace for a rapid escalation in climatic shocks. Absent of climate action, end-of-century impacts dwarf climate shocks to-date, while limiting warming to 1.5°C will prevent a potentially massive expansion in climate impacts beyond 2030. Accelerated adaptation action and efforts to address loss and damage will be essential to managing the climate crisis. Finally, increased investments in knowledge and data will continue to prove crucial to further refining understanding of the nature of this crisis and effective response strategies going forwards.

Thank you!

Please feel free to contact us at secretariat@v-20.org
for any further questions or clarifications.

CVM3 - Key Findings



CVM3 - Key Findings

Health Impacts

Heat-related Deaths

of people over 65 years of age could increase by **1,540%** by the end of the century if no climate action is taken, reaching **3.4** million deaths annually.

Global Deaths

91% of the projected increase in heat-related deaths could be avoided by limiting global mean temperature increase to 1.5˚C, against just 56% avoided if temperatures are allowed to rise to just below 2˚C.

3.35 million Heat Deaths among Vulnerable Age Groups

Heat deaths among vulnerable age groups alone would reach as much as **3.35 million** annually by the end of the century if no climate action is taken.

Almost 1 Million Additional Heat-related Deaths by 2090 in India

Without accelerated climate change adaptation and mitigation, India alone could see almost **1 million** additional heat-related deaths by 2090.

Exposure to Days of High Wildfire Danger

is projected to increase by **8.5%** at 1.5˚C. This could triple by end of the century if no action is taken.

Exposure to life-threatening heatwaves

Exposure of vulnerable age groups to life-threatening heatwaves could increase by **350%** with temperatures rising to 1.5°C. By the end of the century, this could rise further to **2,510%** if temperatures rise to just below 2°C, and to **3,310%** if no climate action is taken.

218% More Person-Hours Exposed to Heat Stress During Phsiycal Activity

if no climate action is taken, posing at least moderate heat stress risk during physical activity of moderate intensity by the end of the century. These at-risk person-hours could be halved by limiting temperature rise to 1.5°C.

4.75 Trillion More Person-Hours Exposed to Heat Stress During Physical Activity

at just 1.5°C of warming, exceeding moderate heat stress risk during physical activity of moderate intensity.

20% of Hours of Heavy Physical Labor Lost

by end of the century if no action is taken. Under a 1.5˚C scenario, this loss would be **7.6%**.

Labour Losses Affect Warmer Latitudes Most

The highest increases in the loss of labour hours are located in the planet's warmest latitudes – Central Africa, West Africa, South Asia, and Southeast Asia.

Dengue Transmission

The number of countries with conditions suitable for dengue is projected to increase by as much as **22%** by end of century. This increase would be just **4%** if temperature rise is limited to 1.5°C.

Re-emergence of Dengue in European Mediterranean

Risk of Dengue Re-emergence in the European Mediterranean (including Greece, Italy and Spain) is projected to be at risk of re-emergence of dengue transmission by the end of the century if no climate action is taken.

Dengue Conditions

77% of the countries that could potentially develop suitable conditions for mosquito borne illnesses like dengue this century could be avoided if temperatures are capped at 1.5°C.

Malaria Outbreaks

As temperatures rise to 1.5°C in the coming decade, **12%** of the areas with no historic malaria suitability will become newly suitable for the transmission of this tropical disease.

Vibrio[1] Transmission

The global coastal area suitable for transmission of Vibrio is projected to increase by **103%** if no action is taken. This falls to **12%** at 1.5˚C.

Baltic Coastline

As much as **100%** of the Baltic coastal waters could become suitable for the transmission of Vibrio bacteria, which is responsible for severe gastroenteritis, wound infections, ear infections and life-threatening septicaemia.

1 Billion Additional People at Risk of Vibrio Infections

Without climate action, more than **1 billion** additional people would be put at risk of Vibrio transmission by 2090

Current warming of around 1.1°C is already leading to climate impacts with negative effects for people's health, economies and habitats across the world