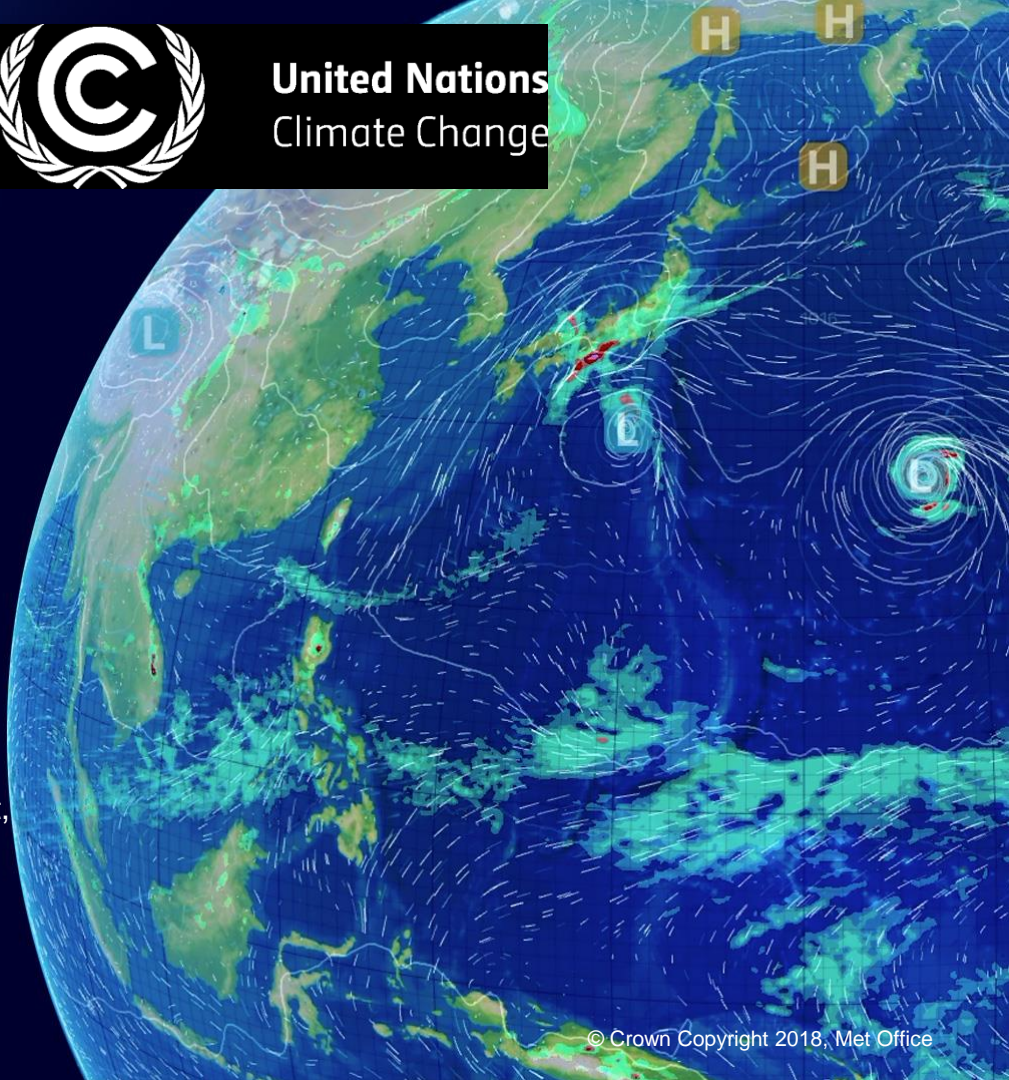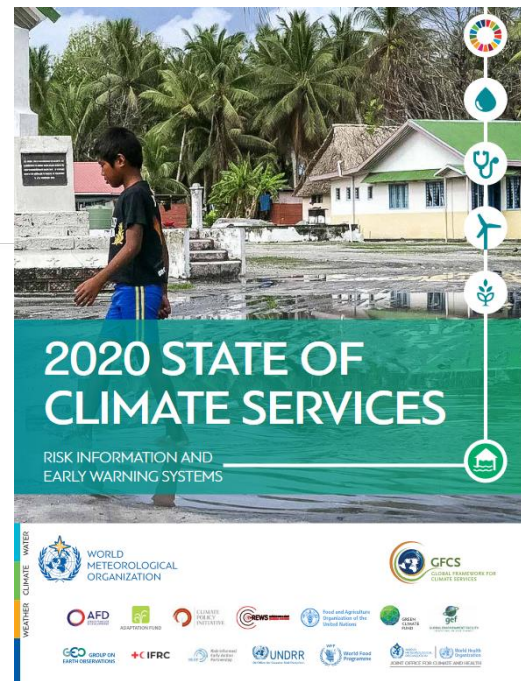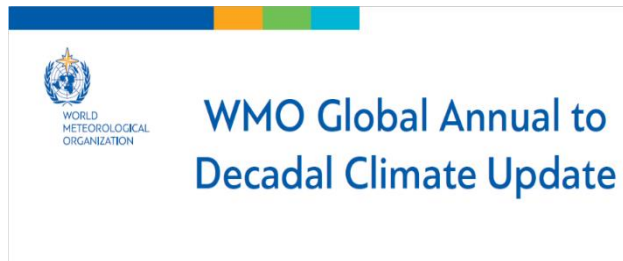# Current state of the climate and progress in providing climate services, WMO

Adam Scaife, Head Long Range Prediction, Met Office, UK
John Kennedy, Met Office Hadley Centre, United Kingdom
Omar Baddour, Head, Climate Monitoring and Policy Support, World Meteorological Organization, Switzerland
Maxx Dilley, Director, Climate Services, World Meteorological Organization, Switzerland

United Nations
Climate Change

State of the Global Climate 2020

WEATHER CLIMATE WATER

State of the Global Climate 2020

WORLD METEOROLOGICAL ORGANIZATION

WMO-No. 1264

WORLD METEOROLOGICAL ORGANIZATION

WMO Global Annual to Decadal Climate Update

2020 STATE OF CLIMATE SERVICES

RISK INFORMATION AND EARLY WARNING SYSTEMS

WEATHER CLIMATE WATER

WORLD METEOROLOGICAL ORGANIZATION

GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

WMO OMM

State of the Global Climate 2020

Led by the WMO with inputs from over 70 WMO members, 40+ scientific experts

In collaboration with UN agencies:
UNEP, FAO, WFP, UNHCR, IOM, IOC UNESCO, WHO, IMF

Key climate indicators in 2020:

Record high CO2, CH4 and N2O despite COVID-19
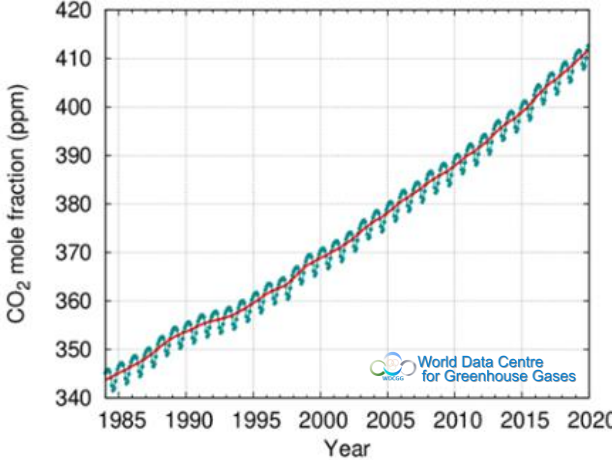
One of three warmest years on record

Numerous regional temperature records e.g. Finland

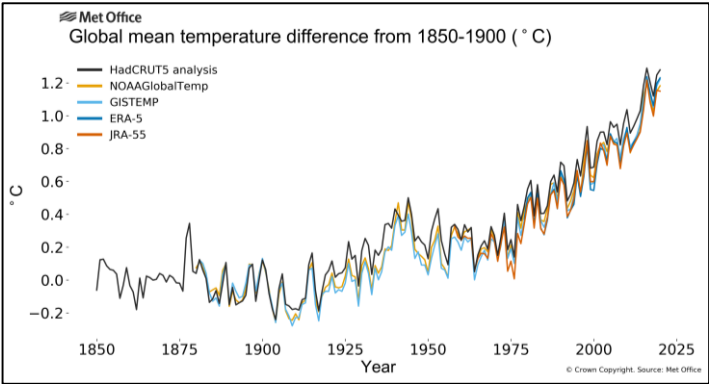Annual global temperature ~1.2°C above 1850-1900

CO$_2$ concentration

Global Temperature

WMO OMM

State of the Global Climate 2020

Key climate indicators in 2020:

Record high ocean heat content
Record high sea level
Both are accelerating
Near record Arctic sea-ice minimum

**High impact events in 2020 included:**

Siberian heatwave
Extreme snowfall in parts of N America and E Asia
Widespread extreme rainfall and summer flooding across Asia

In 2020, millions were doubly hit:
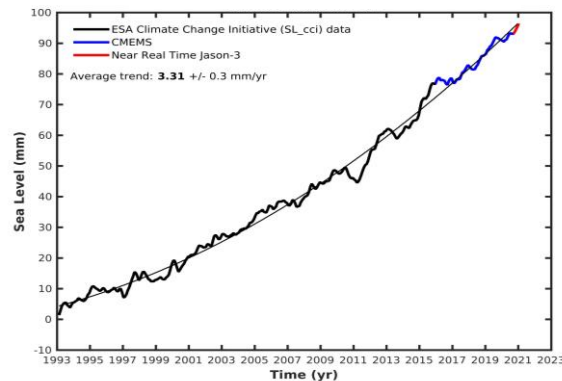**climate-related disasters + the COVID-19 pandemic**

Climate related events => ~23 million displacements of people on average each year over last decade

Risks often arise from compound events e.g. flooding and worst locust infestation in E Africa for 25 years

Ocean Heat Content

MERCATOR OCEAN INTERNATIONAL
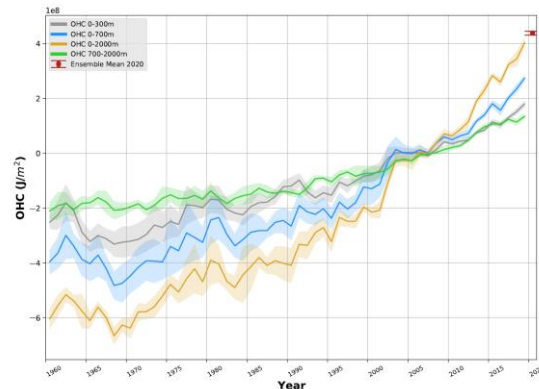
Global Mean Sea Level

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Global Annual to Decadal Climate Update

WMO operational decadal predictions

The Met Office is a designated Lead Centre for Annual-to-Decadal Climate Prediction (LC-ADCP). The LC-ADCP collects and provides hindcasts, forecasts and verification data from a number contributing centres worldwide.

BCCR SMHI
Reading MPI
MOHC IPSL CCCMA
BSC CERFACS LASG MRI GFDL
MIROC NCAR NRL

Global Producing Centres

BSC	CCCMA	DWD	MOHC

Contributing Centres

BCCR	GFDL	MPI	NRL
CERFACS	IPSL	MRI	Reading
CSIRO	LASG	NCAR	SMHI
DMI	MIROC		

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www.wmolc-adcp.org

International effort

State of the science climate models

Climate *predictions* for next 5 years

WORLD METEOROLOGICAL ORGANIZATION

Global Annual to Decadal Climate Update

Target years: 2021 and 2021-2025

Executive Summary

This update presents a summary of annual to decadal predictions from the WMO designated Global Producing Centres and other contributing centres for the period 2021-2025. Latest predictions suggest that:

- Annual mean global (land and sea) mean near-surface temperature is likely to be at least 1°C warmer than pre-industrial levels (defined as the average over the years 1850-1900) in each of the coming 5 years and is very likely to be within the range 0.9 – 1.8°C
- It is about as likely as not (40% chance) that at least one of the next 5 years will be 1.5°C warmer than pre-industrial levels and the chance is increasing with time
- It is very unlikely (10% chance) that the five-year mean global near-surface temperature for 2021-2025 will be 1.5°C warmer than pre-industrial levels
- The chance of at least one year exceeding the current warmest year, 2016, in the next five years is 90%
- Over 2021-2025, almost all regions, except parts of the southern oceans and the North Atlantic are likely to be warmer than the recent past (defined as the 1981-2010 average)
- Over 2021-2025, high latitude regions and the Sahel are likely to be wetter than the recent past
- Over 2021-2025 there is an increased chance of more tropical cyclones in the Atlantic compared to the recent past
- In 2021, large land areas in the Northern Hemisphere are likely to be over 0.8°C warmer than the recent past
- In 2021, the Arctic (north of 60°N) is likely to have warmed by more than twice as much as the global mean compared to the recent past
- In 2021, southwestern North America is likely to be drier whereas the Sahel region and Australia are likely to be wetter than the recent past.

Global Annual to Decadal Climate Update

Probability of temporary exceedance of 1.5ºC
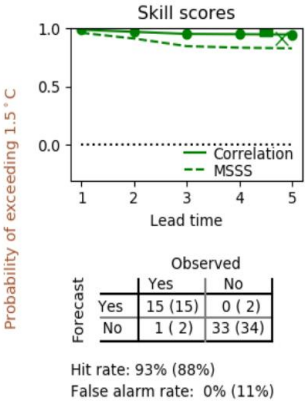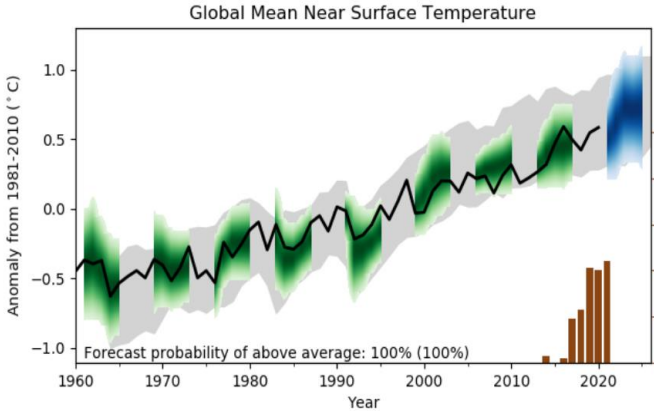
5 year rainfall predictions
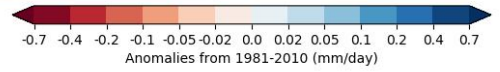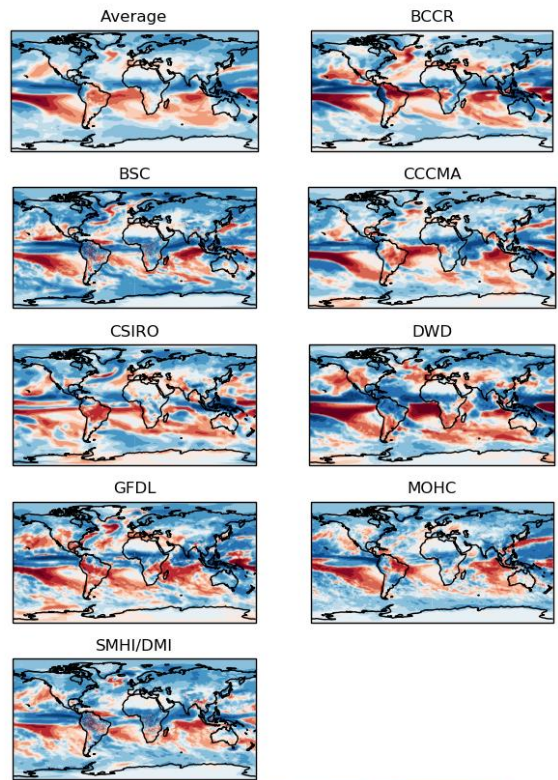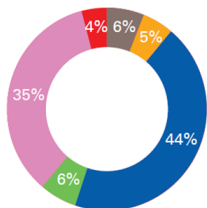

Climate predictions updated each year

⇒ **Increasing chance of _temporary_ 1.5 deg**
⇒ **Increased chance of wetter Sahel**
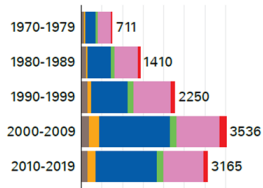⇒ **Increased chance of Atlantic storms**

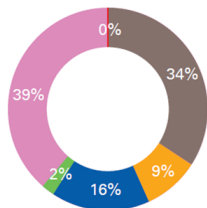# State of Climate Services 2020

Disasters

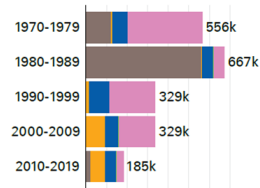Total = 11 072 disasters

Number of reported disasters

Period	Value
1970-1979	711
1980-1989	1410
1990-1999	2250
2000-2009	3536
2010-2019	3165

Deaths

Total = 2 064 929 deaths

Number of reported deaths

Period	Value
1970-1979	556k
1980-1989	667k
1990-1999	329k
2000-2009	329k
2010-2019	185k

Losses

Total = US$ 3640.1 billion
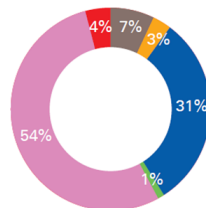
Reported economic losses in US$ billion
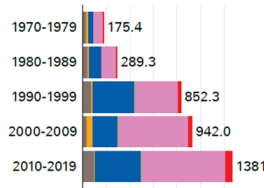
Period	Value
1970-1979	175.4
1980-1989	289.3
1990-1999	852.3
2000-2009	942.0
2010-2019	1381

Legend: Drought · Extreme temperature · Flood · Landslide · Storm · Wildfire

Since 1970, SIDS have lost US$ 153 billion due to weather, climate and water related hazards

70% of deaths reported over the period 1970-2019 occurred in LDCs

Nearly 90% LDCs and SIDS have identified early warning systems as a top priority in their NDCs

In the last 50 years, 79% of disasters involved weather, water- or climate-related hazards.

State of Climate Services 2020

	SDG 1	SDG 2	SDG 3	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 11	SDG 13	SDG 14	SDG 15	SDG 16
CO₂ Concentration													
Ocean Acidification													
Global Mean Surface Temperature													
Ocean Heat Content													
Sea Ice Extent													
Glacier Mass Balance													
Sea Level Rise													

Across the board, the Sustainable Development Goals are highly sensitive to climatic indicators.

Continuation of current and projected trends in these indicators will drive increasing demand for climate services.

State of Climate Services 2020

NATIONALLY DETERMINED CONTRIBUTIONS

85% identified climate services as "top" priority

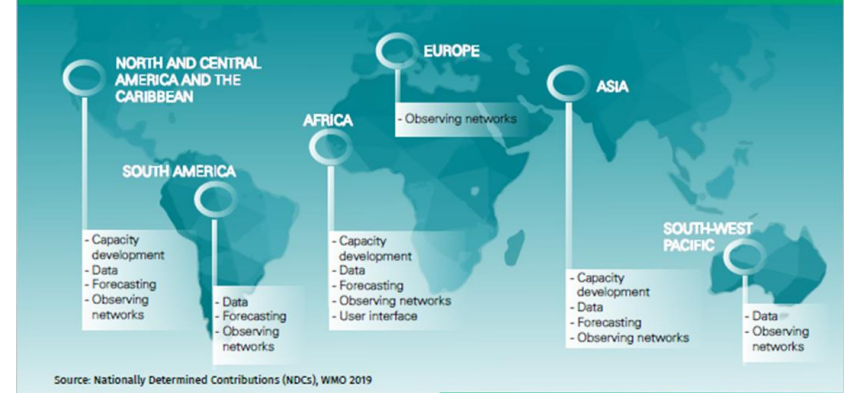| Category	Value
Agriculture and Food Security	117
Water	113
Disaster Risk Reduction	96
Health	91
Forestry	78
Infrastructure	73
Ecosystem	71
Biodiversity	67
Energy	55
Gender	23
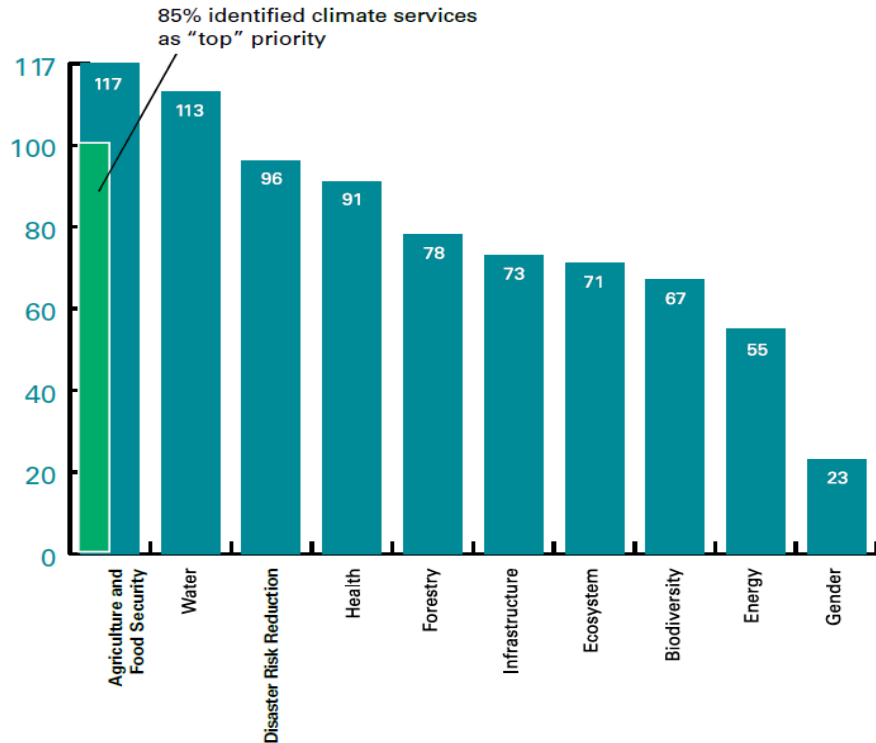
Global Climate Service Needs: Agriculture and Food Security Source: NDCs

NORTH AND CENTRAL AMERICA AND THE CARIBBEAN

EUROPE
- Observing networks

AFRICA

ASIA

SOUTH AMERICA
- Capacity development
- Data
- Forecasting
- Observing networks

- Data
- Forecasting
- Observing networks

- Capacity development
- Data
- Forecasting
- Observing networks
- User interface

SOUTH-WEST PACIFIC

- Capacity development
- Data
- Forecasting
- Observing networks

- Data
- Observing networks

Source: Nationally Determined Contributions (NDCs), WMO 2019

This demand is seen in UNFCCC Parties' Nationally Determined Contributions to the Paris Agreement.

Agricultural, water, disaster reduction, and health being top climate adaptation priorities.

Climate services for adaptation are explicitly identified as top priorities in many Party's NDCs.

State of Climate Services 2020
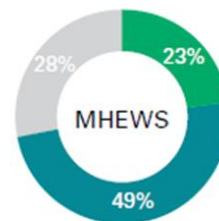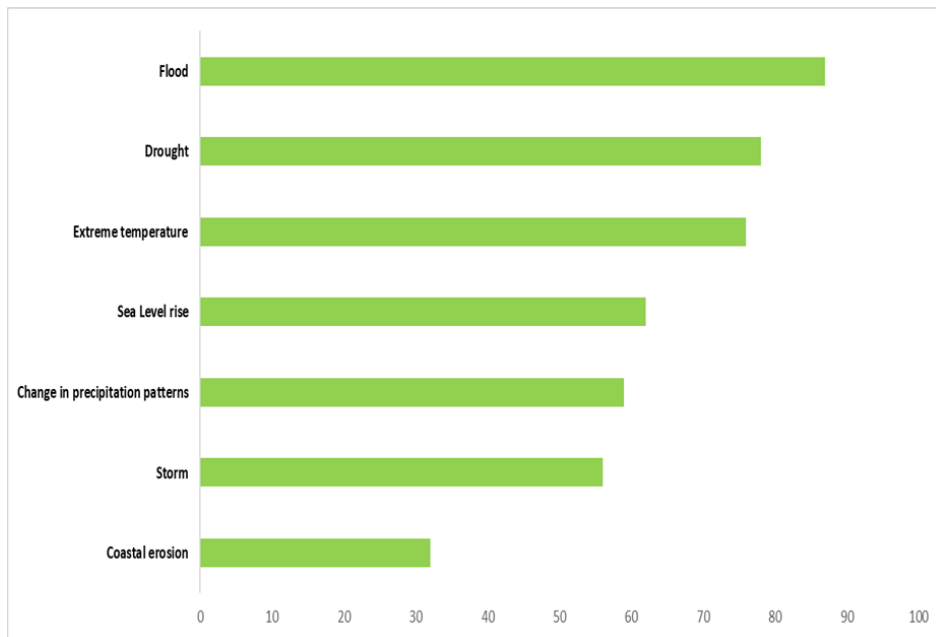
46 000 in 100 000 people are covered by early warnings

■ Yes ■ No ■ NA

Figure 32: Members that reported having a MHEWS in place, as a percentage of the total number of LDCs (47).

Climate services currently fall short of demand

In LDCs, for example, multi-hazard early warning systems addressing the top hazards are available in only 1/4 of countries and less than half of people receive early warnings.

WMO OMM

State of Climate Services 2020

PARTNERS
FAO, the US National Oceanic and Atmospheric Administration and Airbus.

CASE STUDIES
LOCUST SWARMS

EWS protects African nations from upsurge in desert locust

Desert locust early warning intervention has stopped the risk spreading further, while saving millions of dollars' worth of cereal across 10 countries.

Case studies suggest that returns on investments in climate services can be substantial.

Desert locust early warning systems with weather and climate information are estimated by the United Nations Food and Agriculture Organization to have contributed to saving 720,000 tones of cereal production from destruction during the outbreak in 2020 in the Greater Horn of Africa.

Climate continues to warm and some aspects are accelerating

COVID-19 lockdowns: almost no impact on GHG concentrations and global temperature

Strong action needed if we are to slow anthropogenic climate change

Operational predictions are available in real time for adaptation to impending extremes

Prioritize climate actions based on best available climate science

Finance enhanced observing networks and international operational exchange of hydrometeorological data and products

Address the "last mile" service delivery barrier through stakeholder governance and partnerships

Focus on LDC and SID countries where needs are greatest

Fill data gaps by improving in country reporting of climate information and early warning systems

WMO OMM