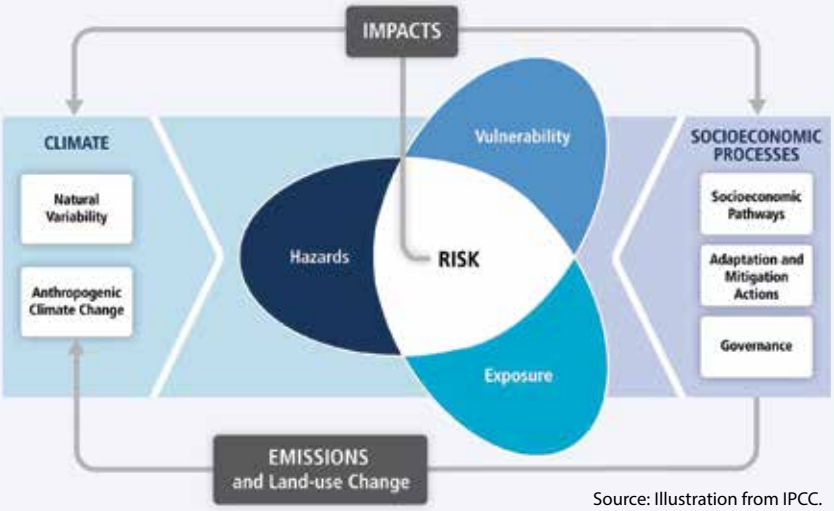
Why monitor climate-related hazards?

IPAC
OECD
BETTER POLICIES FOR BETTER LIVES

This year, Europe experienced one of its worst heatwaves ever, with many countries experiencing record high temperatures. In Pinhão, Portugal, the temperature reached 47°C (116.6°F). Pakistan experienced its worst floods this century, displacing an estimated 33 million people and leading to more than 1 200 casualties. Hurricane Ian had devastating effects in Florida, while cyclone Idai had similar effects in Zimbabwe, Malawi, and Mozambique in March 2019. In 2021, floods and landslides forced 12 million people from their homes in India, Nepal and Bangladesh, due to exceptionally heavy monsoon rains. In 2020, Australia was affected by its worst-ever bushfire season.

Climate change poses a growing threat by influencing the intensity and, in some cases, the frequency of occurrence of such hazards. Monitoring exposure to climate-related hazards supports policymakers to develop and implement appropriate policies and reduce climate exposure and vulnerability. Measuring the risks of climate-related hazards can be linked to three dimensions: hazard, exposure and vulnerability.

DIMENSIONS OF CLIMATE RISK



Source: Illustration from IPCC.

- **Natural hazards** are the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.
- **Exposure:** the presence of people or assets in areas prone to climate-related hazards (e.g. population density, valuable ecosystems).
- **Vulnerability**: the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of climate-related hazards (e.g. an individual's or household's socio-economic status, particular vulnerable groups in society).

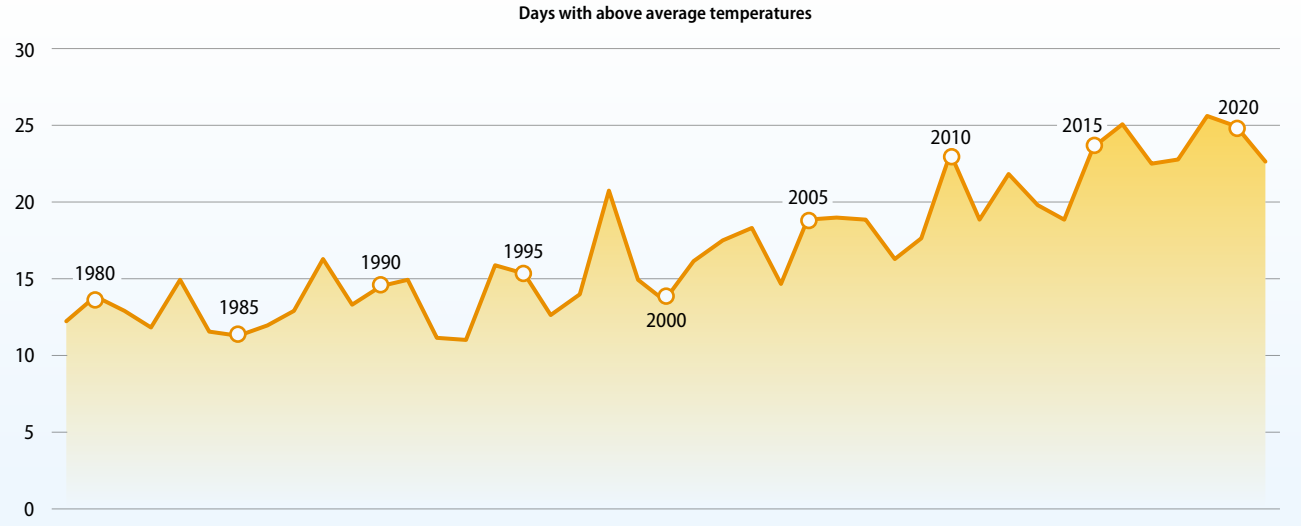
Using advances in Earth observation and data processing technologies, the OECD developed a comprehensive set of indicators on climate-related hazards at both global and local scales. Combining these physical measurements with other geo-referenced socio-demographic data allows for the development of internationally comparable indicators on exposure with global geographic coverage over long time-periods. The new indicator set was developed by the OECD International Programme for Action on Climate (IPAC) as part of a broader effort to develop indicators to support evidence-based policy analysis and government decision-making.

The indicator set is available to policymakers and analysts. Key results show that:

- ***Exposure to climate-related hazards** is increasing and becoming more intense.*
- ***Significant differences exist** across countries in their exposure to such hazards. A one-size fits all policy is not possible.*
- ***Extreme and increasing heat conditions** are a key hazard faced by most countries, affecting billions of people a year.*
- ***Worsening drought conditions** and increased extreme precipitation could threaten food security.*
- ***Burned area is decreasing** across the IPAC region but still leads to tens of thousands square kilometres of land burned in 2021, while 20% of global burned area is concentrated in 10 IPAC countries.*

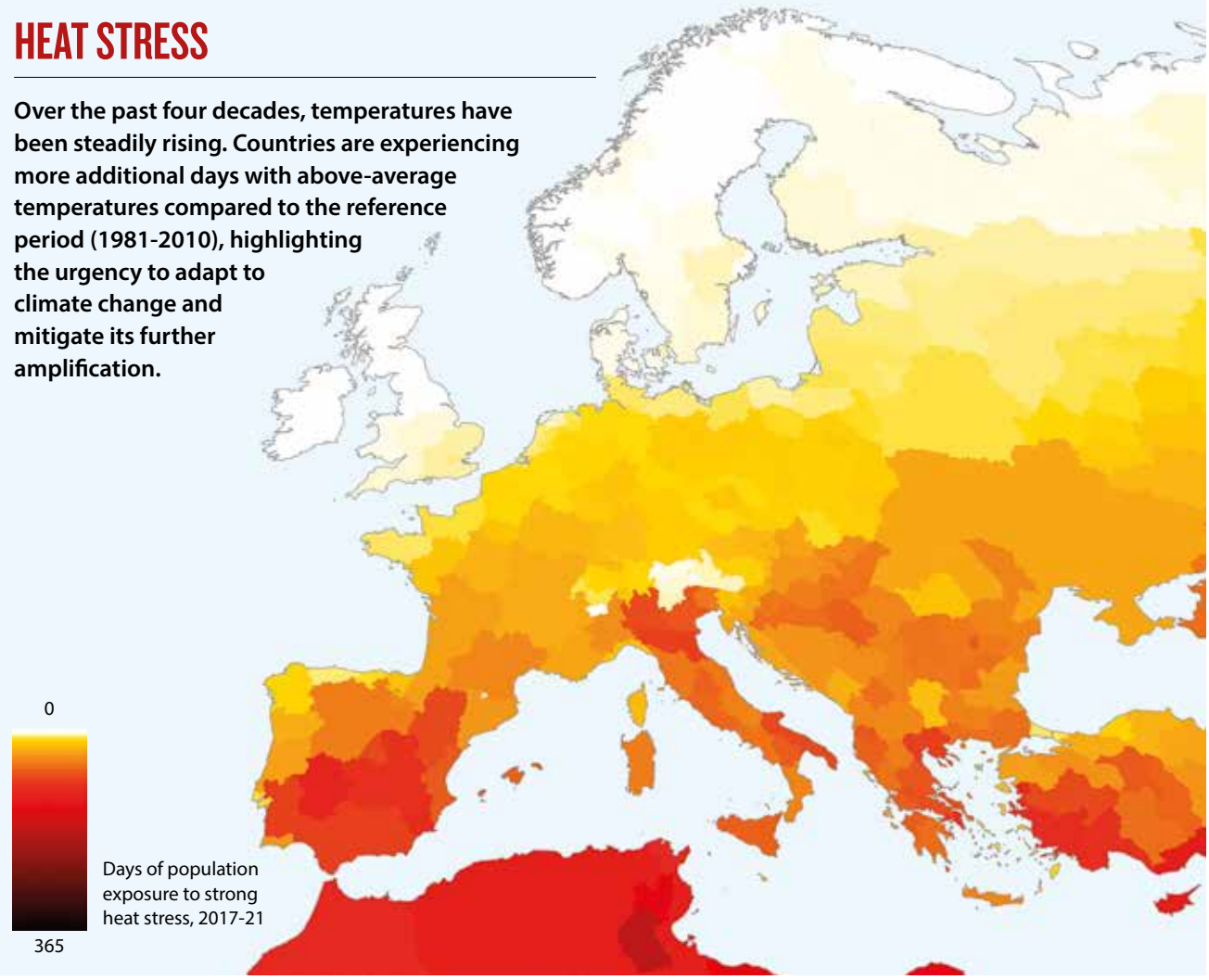
OECD indicators on climate-related hazards

Over the past five years, population exposure to heat stress has been particularly high in Southern Europe where countries such as Greece, Italy and Spain experienced, on average, more than 60 days of strong or worse heat stress. These countries also experienced more than 10 additional days with strong stress per year compared to the reference period 1981-2010, highlighting the serious risks associated with heat stress increases due to climate change.



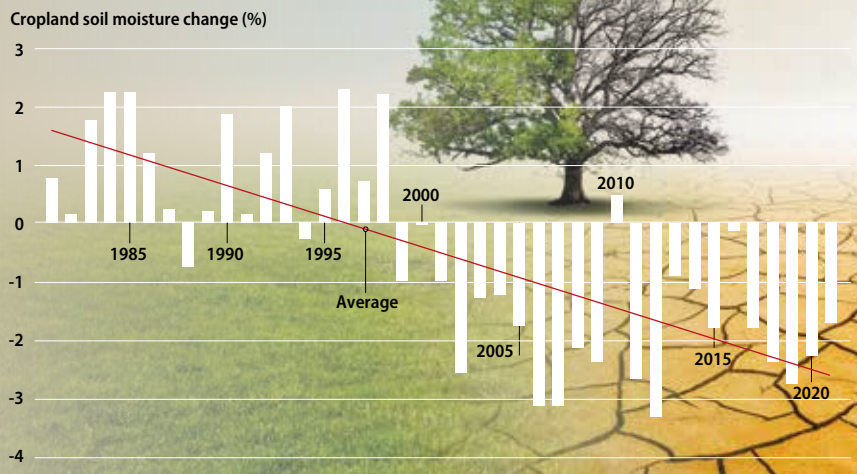
HEAT STRESS

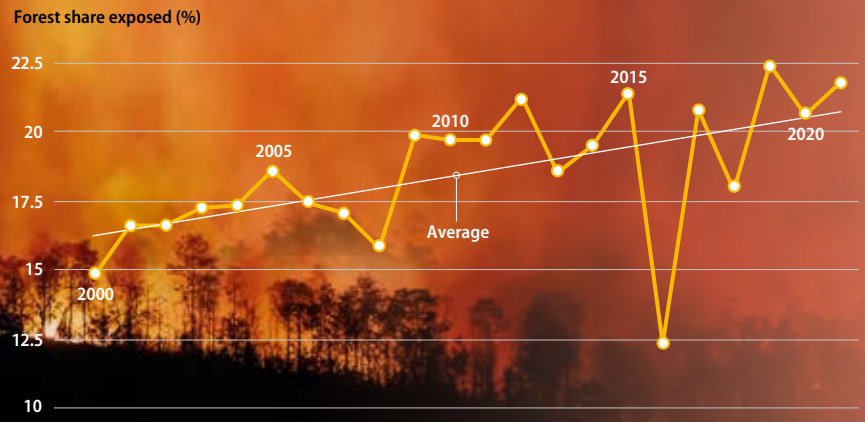
Over the past four decades, temperatures have been steadily rising. Countries are experiencing more additional days with above-average temperatures compared to the reference period (1981-2010), highlighting the urgency to adapt to climate change and mitigate its further amplification.



DROUGHTS

Over the past 41 years, croplands have been increasingly affected by extreme droughts across OECD countries. Over the past five years, an average cropland soil moisture decline of 1.85% was observed, highlighting the impact of worsening drought conditions on croplands due to climate change.



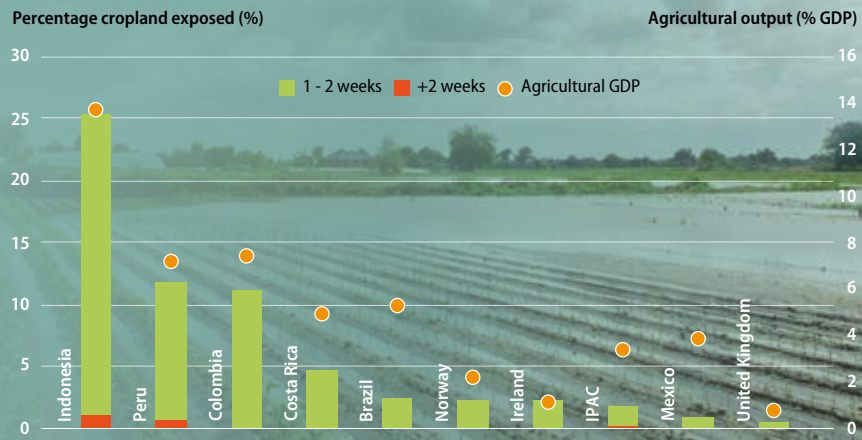


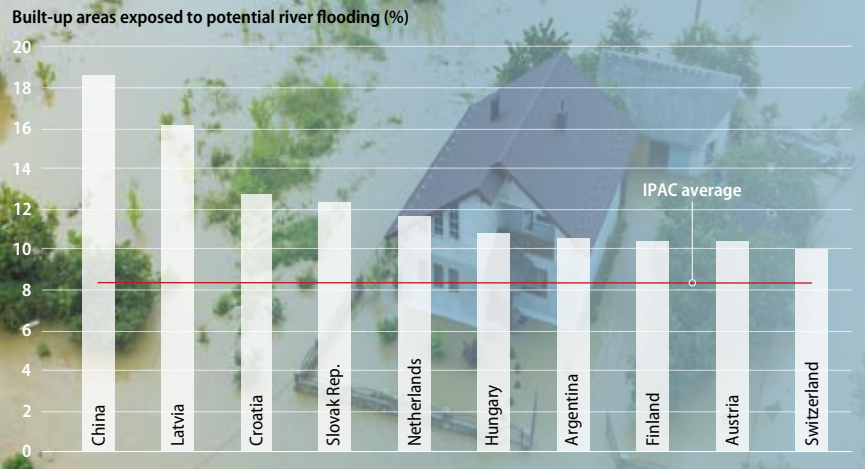
WILDFIRES

Over the past two decades, forest exposure to wildfire danger has been increasing across IPAC countries, highlighting the considerable risk forests face with regard to wildfires. This warrants caution considering the role forests play for climate change mitigation measures around the world.

EXTREME PRECIPITATION

IPAC countries, with the highest proportion of cropland exposed to extreme precipitation, also have a higher share of GDP allocated to agricultural activities.





RIVER FLOODING

A subset of IPAC countries has a considerable porportion of its built-up area exposed to river flooding, above the IPAC (red line) average.

OECD indicators on climate-related hazards

IPAC
OECD
BETTER POLICIES FOR BETTER LIVES

The OECD set of climate-related hazard indicators addresses a key gap in policy relevant information: It can support countries to understand which areas, regions and communities are affected by climate-related hazards. It develops internationally comparable indicators that are harmonised across countries, supporting national and international policy analysis. More specifically, the data set has:

- **GLOBAL GEOGRAPHIC COVERAGE: the indicators cover all countries in the world and have a special focus on IPAC countries.**
- **TIME SERIES: the indicator set goes back to 1979 and has data as recent as 2021, depending on data availability.**
- **TIMELINESS: the indicator set is based on data sources that are regularly updated, permitting consistent time series and anomaly calculations.**
- **SUBNATIONAL FOCUS: High-resolution hazard data is overlaid with other socio demographic or economic data to produce indicators at varying national and subnational scales.**

EXTREME TEMPERATURE

Extreme temperature, measured by the number of hot days or tropical nights, can negatively impact human health. This is expected to occur more often due to climate change.

DROUGHTS

Drought has serious socio-economic impacts, worsened in certain regions due to climate change. This indicator is measured through satellite-based soil moisture anomaly data.

WILDFIRES

Wildfires can threaten human lives and forests while occurring more frequently and intensively due to climate change.

EXTREME PRECIPITATION

Precipitation extremes can cause sudden flooding, impacting agriculture and leading to a loss of agricultural yield. This is expected to worsen due to climate change.

RIVER FLOODING

River flooding causes serious economic losses, impacting the population and built-up areas, and is expected to worsen due to climate change.

COASTAL FLOODING

Coastal flooding threatens coastal regions and communities and is expected to occur more often due to climate change.

WIND THREATS

Wind threats are common hazards to humans directly through flying debris and falling trees, or damage to built-up areas.

DATA ACCESS AND FURTHER READING

Maes, M., et al. (2022), "Monitoring exposure to climate-related hazards: Indicator methodology and key results", *OECD Environment Working Papers*, No. 201, OECD Publishing, Paris, https://doi.org/10.1787/da074cb6-en.

IPAC site: www.oecd.org/climate-action/ipac

CONTACT

Head of Environmental Performance and Information Division: **Nathalie Girouard** – nathalie.girouard@oecd.org

Programme Lead, IPAC: **Rodrigo Pizarro** – rodrigo.pizarro@oecd.org

Senior Economist: **Ivan Haščič** – ivan.hascic@oecd.org

Earth Observation Data Scientist: **Mikaël J.A. Maes** – mikael.maes@oecd.org