



Physical climate risks

Juli 2023

Domino effects of climate change still seriously underestimated

Amplifying effects due to climate change

Secondary effects resulting from rapid climate change, such as migration, political and geopolitical tensions and domestic polarisation can cause the overall risk picture to be underestimated by governments, businesses and individuals. In short, people are not prepared for the temperature-induced changes that await humanity, even though the effects of climate change are already visible in many areas and seemingly effective measures are being taken.

As soon as extreme weather events plague the world with increasing frequency and severity, a domino effect will occur in which many countries will be hit by second-round risks. The acceleration of climate-related problems is seriously impacting certain economies and many businesses, while at the same time reducing the resources available to address the origins of climate problems. Rather, most companies and public authorities are insufficiently prepared for the mutually amplifying effects resulting from global warming and more frequent extreme weather events.



Climate risks increase by impacting tipping points

Relevant for risk assessment per warming scenario are tipping points. These tipping points contribute to changes in the climate system, loss of biodiversity and amplify global warming. For example, if permafrost were to disappear then the greenhouse gases hidden below would be released, contributing significantly to even quicker warming.

As a result of more climate-related impacts, the indirect consequences for society, nature and people are increasing rapidly and to a more extreme extent. More and more often, we are being rocked by disruptive weather events and extreme natural responses, which seem to keep pace with ever-rising temperatures. Economies, businesses and individuals are increasingly exposed to the physical risks described below, initiated by the steadily increasing global temperature rise. Adjustments are being made in many areas, especially in the Netherlands, but physical hazards are at risk of increasing significantly.

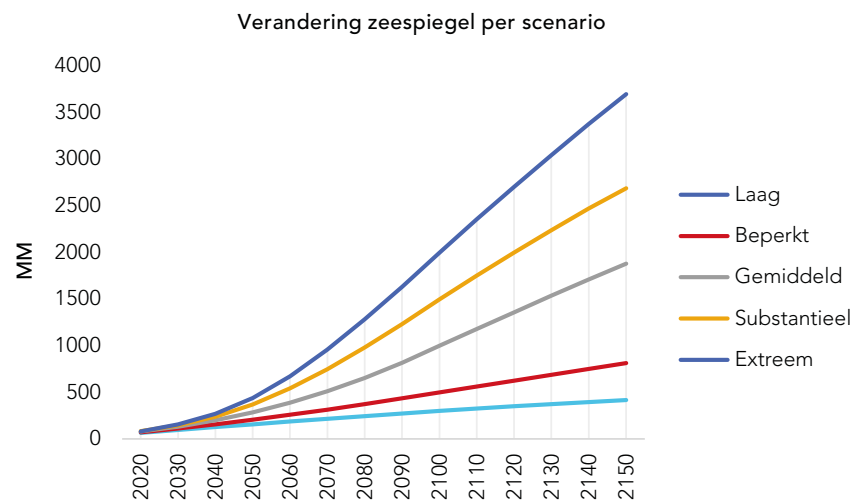
Enkele voorbeelden van opwarmingversterkende kantelpunten



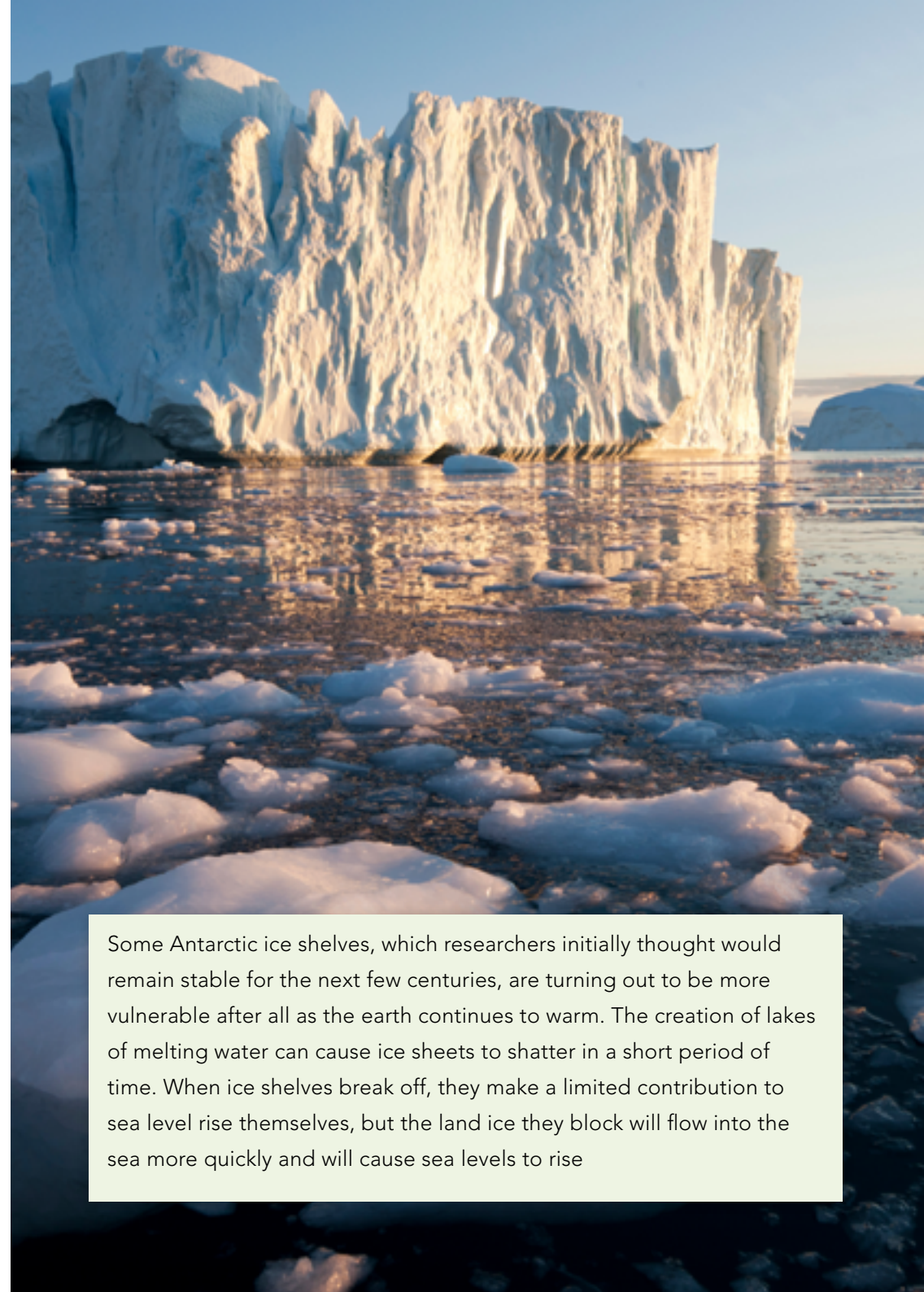
Flood risk from rising sea levels

Sea level rise is caused by a combination of the oceans warming and land ice melting. Global sea level rise has now increased from 2mm to 4mm per year, according to NASA. Much is still uncertain about the rate at which sea levels will rise but evidence is piling up for ice masses shrinking faster than previously believed. Flood risk is relevant not only to homes in coastal areas and near rivers but also to businesses, both indirectly (through decrease in economic activity in the affected region) and directly (due to damage to logistics centres and production facilities).

Prognose zeespiegelstijging in 4 scenario's (mediaan/gemiddelde range) 2020-2050



Source: NASA

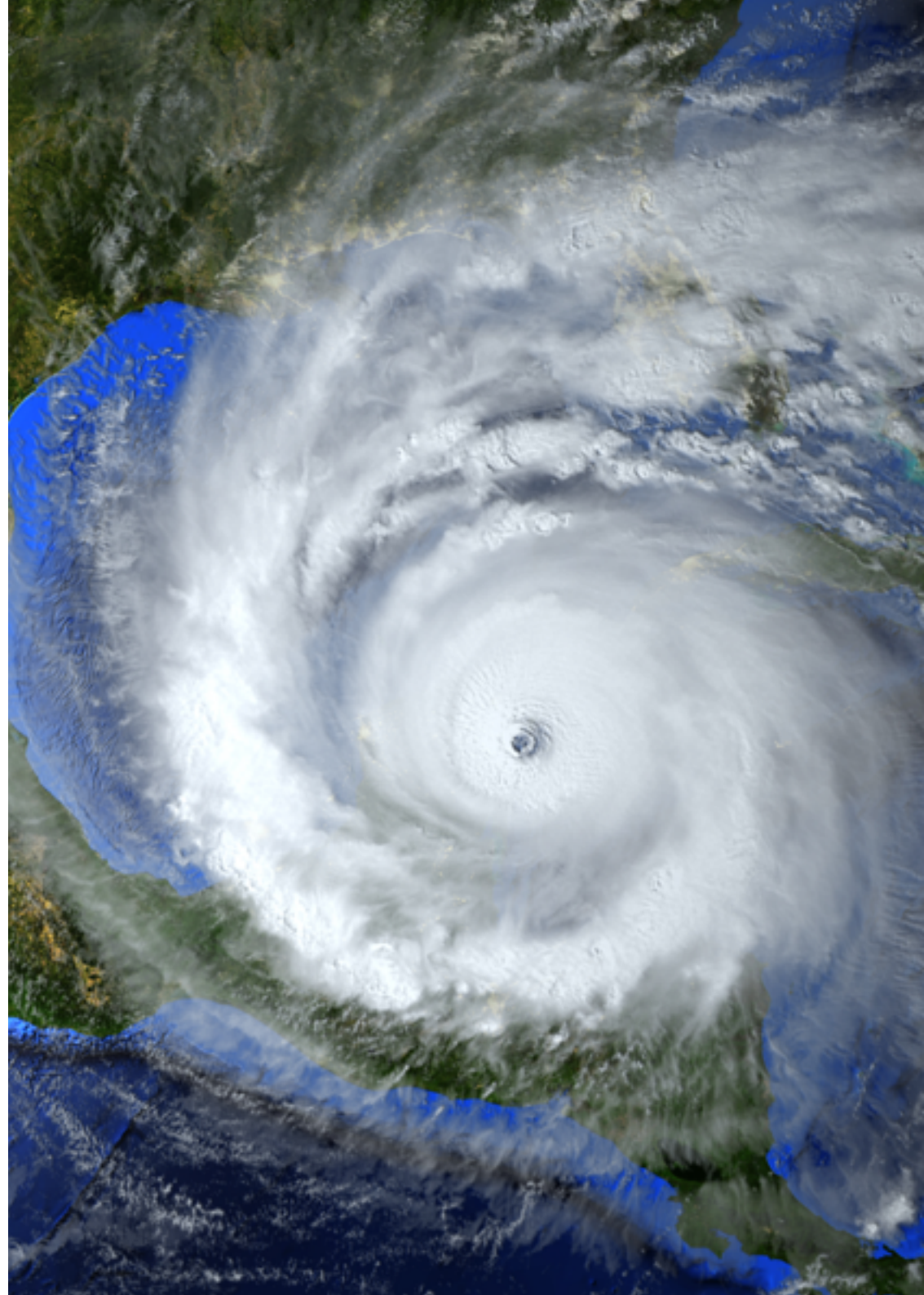


Some Antarctic ice shelves, which researchers initially thought would remain stable for the next few centuries, are turning out to be more vulnerable after all as the earth continues to warm. The creation of lakes of melting water can cause ice sheets to shatter in a short period of time. When ice shelves break off, they make a limited contribution to sea level rise themselves, but the land ice they block will flow into the sea more quickly and will cause sea levels to rise

Storms and hurricanes will become more frequent

Globally, extreme storm risk will increase as climate changes. With every degree of warming, storms will become more frequent and powerful. Heavy storms and hurricanes can cause significant damage to forests, buildings, transport and energy and other infrastructure. Calculations published in the scientific journal *ScienceAdvances* show that most regions where tropical storms and hurricanes occur may face more powerful storms in a warmer climate. When taking into account population density, a measure of social vulnerability, the risks of cyclones will increase most for people living in South-East Asia.

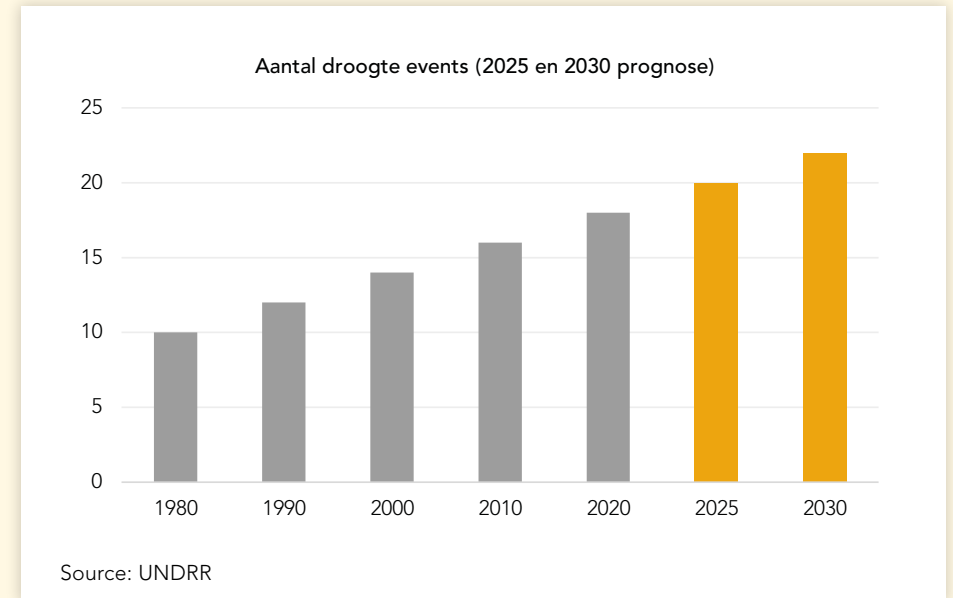
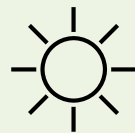
Most regions where tropical storms and hurricanes occur may face more powerful storms in a warmer climate. These changes are linked to higher sea water temperatures, as hurricanes can draw more energy from them



Significant economic impact due to drought

Desertification and shortage of drinking and other water will cause increasing problems in the future. Increasing drought due to lack of rainfall, water harvesting and evaporation affect surface water and groundwater levels. This has economic impact as a result of damage to various sectors, such as transport (roads, rails and less navigable rivers), energy (increased electricity demand due to more air-conditioning use, while scaling up production is hampered by less cooling water availability), agricultural sector (crop failures, lower land yields and livestock mortality), and ecosystems (disappearance of forests due to drought and increase in forest fires). Drought is threatening to become permanent as water flows also decrease.

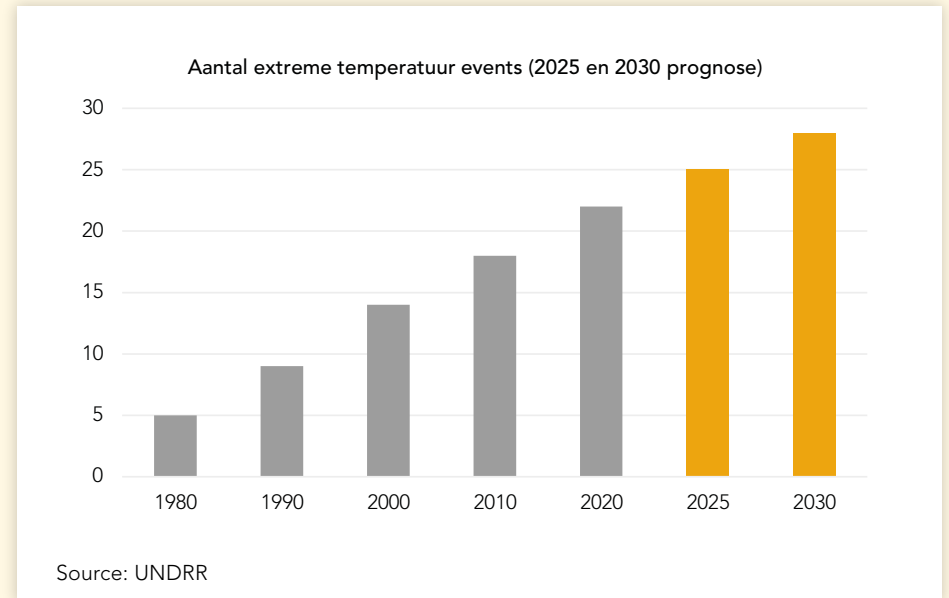
Compared with 1970, periods of extreme drought are already twice as common and forecasts assume further increases. As a result, adverse effects will be more frequent and unforeseen risks will increase



Heat waves damage productivity and fuel inflation

Heat waves involve warm nights in addition to high daytime temperatures. A well-known consequence of heat is heat stress, which reduces labour productivity and increases healthcare costs, with substantial impacts on the economy according to Borg, Xiang et al. The longer the heat lasts, the greater the negative effects. Ultimately, heatwaves will have an increasing impact on economic growth and be detrimental to government bond yields to a greater or lesser extent. Loss of productivity is detrimental to corporate returns and will also drive inflation. Scientists say heat and drought are inextricably linked, which only makes it harder to stop global warming.

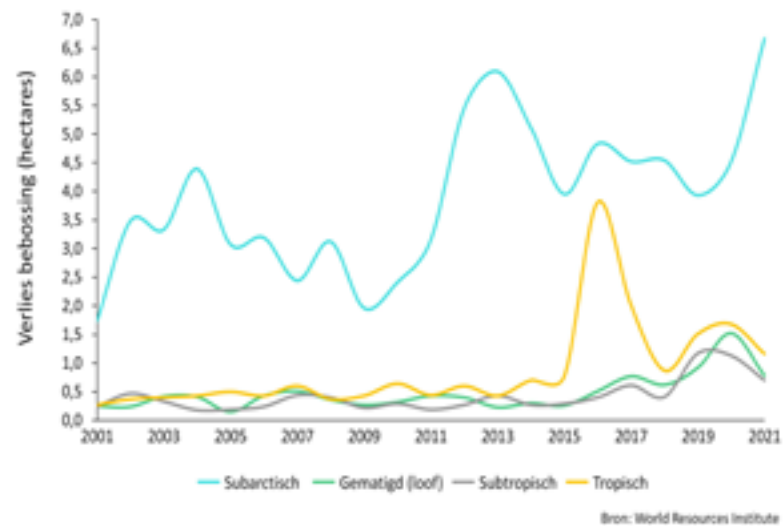
The number of days with extremely high temperatures (heat waves) has already tripled since 1980, and this trend is more likely to continue than slow down at the current rate of global climate change



Forest fires create virtual circle

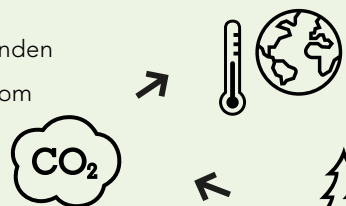
The number of forest fires around the world is increasing visibly, which is also increasing carbon emissions. On the one hand, due to dramatically rapid loss of carbon-absorbing forests. On the other hand, through more carbon emissions as a result of the fires that ultimately accelerate climate change (see causality cycle).

Jaarlijks verlies aan boomdekking door branden per klimaatdomein, 2001-2020



Carbon emissions causality cycle and forest fires

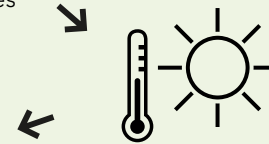
Carbonemissies door bosbranden nemen toe en voeden wederom klimaatverandering



Klimaatverandering gevoed door carbonemissies



Grotere gebieden met bos zullen vaker in de as gelegd worden



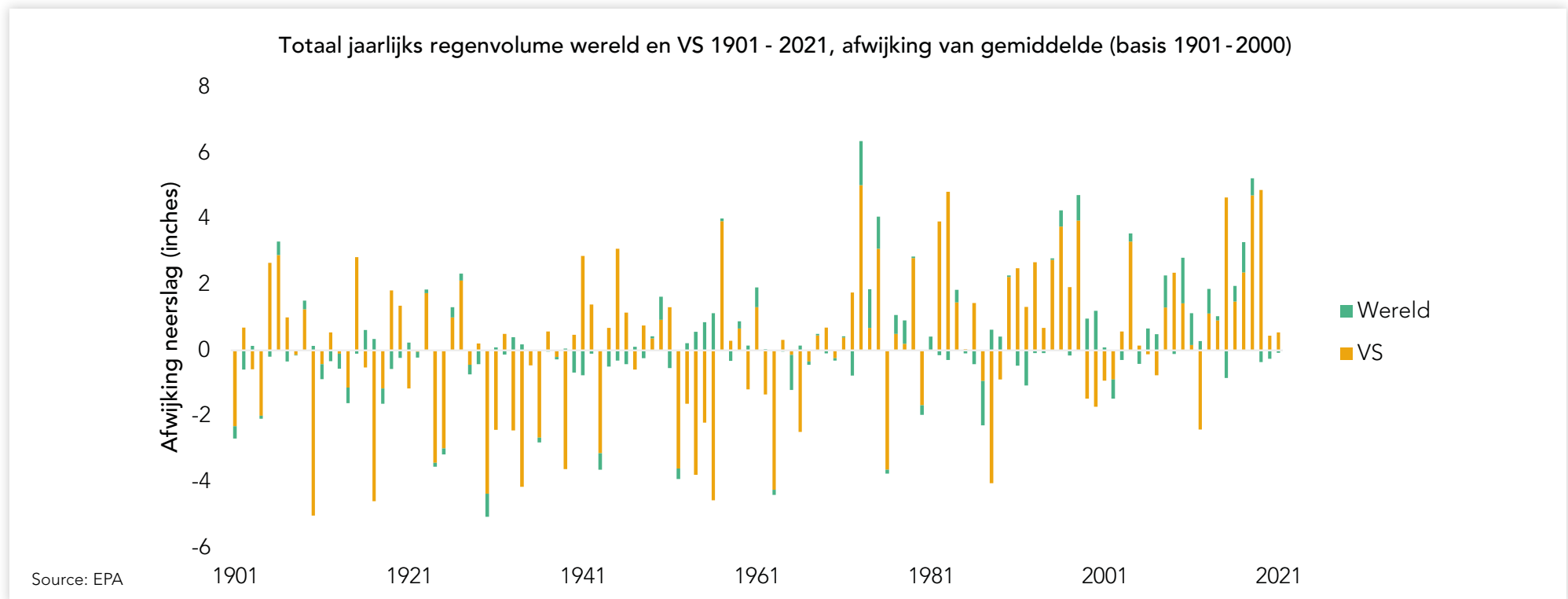
Hitte en droogte zorgen voor brandgevoeligere bebouwing

Increasing extreme precipitation due to warming

Weather extremes cause a great deal of inconvenience and damage. As air in warmer climates contains more moisture, increasing extreme precipitation occurs more frequently. The increase in temperature and moisture means that in the future, heavy showers may develop into showers with thunderstorms, hail and wind gusts. The heaviest showers are expected to intensify the most. Long periods of excess precipitation cause high river levels and groundwater levels.

In recent decades, the trend shows increased precipitation volume on balance (see chart below). Flooding risks to areas near rivers and groundwater problems in areas with poor drainage (e.g. near sandy soils) are increasing. This risk is particularly relevant for mortgages and real estate investments.

On average, from 1991 to 2021, annual rainfall in the US and worldwide increased more frequently and more than in previous decades dating back to 1901



Financial markets underestimate higher warming scenario

To actually limit temperature rise compared with the pre-industrial era to 1.5°C (Paris climate agreement target), we should already be seeing a decreasing trend in global carbon emissions. However, this essential trend reversal is not yet visible. On the contrary, a new climate study by 50 IPCC-affiliated scientists shows that the climate has already warmed by an average of 1.14°C during the period from 2013 to 2022. The assumption was previously 1°C warming. The IPCC estimates that current government policies will result in a temperature increase of 2.7°C by 2100, with catastrophic consequences for climate and biodiversity. Targeted preparation for more pessimistic climate transition scenarios is therefore vital. Physical climate risks will need to receive additional consideration in the investment process and strategic investment policy.

Financial markets are efficient in theory. With this in mind, you can expect future climate risks to be adequately factored in. In practice, however, it is not yet clear which climate risks have actually already been accounted for by financial markets. Despite the fact that many investors have the significance of the topic high on their agenda, the future impact of physical climate impacts is still generally underestimated.



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