

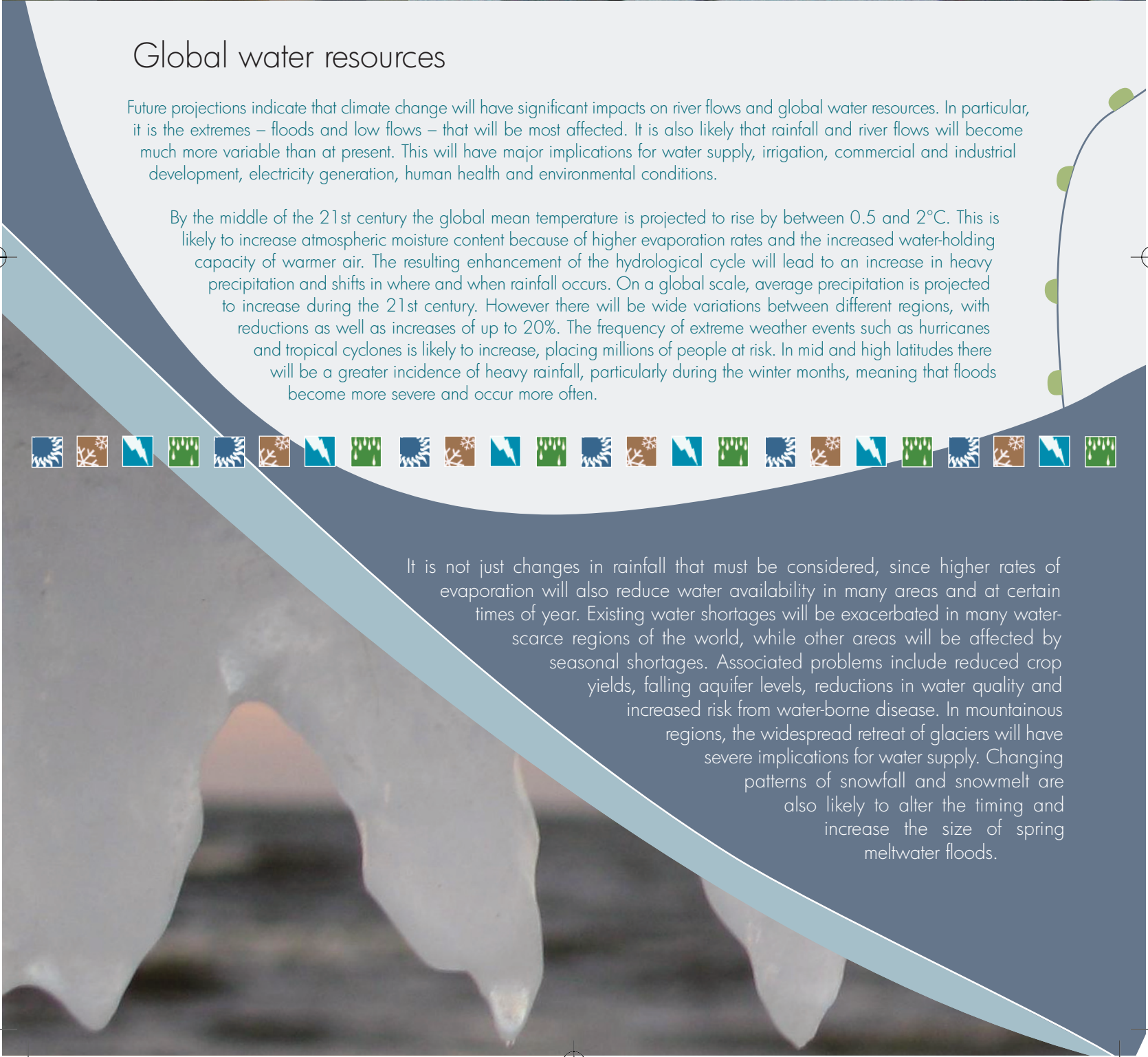
## Global water resources

Future projections indicate that climate change will have significant impacts on river flows and global water resources. In particular, it is the extremes – floods and low flows – that will be most affected. It is also likely that rainfall and river flows will become much more variable than at present. This will have major implications for water supply, irrigation, commercial and industrial development, electricity generation, human health and environmental conditions.

By the middle of the 21st century the global mean temperature is projected to rise by between 0.5 and 2°C. This is likely to increase atmospheric moisture content because of higher evaporation rates and the increased water-holding capacity of warmer air. The resulting enhancement of the hydrological cycle will lead to an increase in heavy precipitation and shifts in where and when rainfall occurs. On a global scale, average precipitation is projected to increase during the 21st century. However there will be wide variations between different regions, with reductions as well as increases of up to 20%. The frequency of extreme weather events such as hurricanes and tropical cyclones is likely to increase, placing millions of people at risk. In mid and high latitudes there will be a greater incidence of heavy rainfall, particularly during the winter months, meaning that floods become more severe and occur more often.



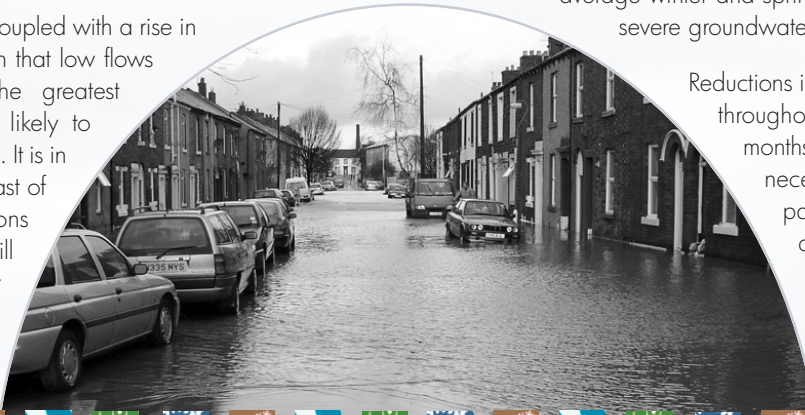
It is not just changes in rainfall that must be considered, since higher rates of evaporation will also reduce water availability in many areas and at certain times of year. Existing water shortages will be exacerbated in many water-scarce regions of the world, while other areas will be affected by seasonal shortages. Associated problems include reduced crop yields, falling aquifer levels, reductions in water quality and increased risk from water-borne disease. In mountainous regions, the widespread retreat of glaciers will have severe implications for water supply. Changing patterns of snowfall and snowmelt are also likely to alter the timing and increase the size of spring meltwater floods.



# Water resources in Ireland

Models indicate that in Ireland winters will be on average wetter, summers drier. However, when showers occur they are likely to be heavier with a greater risk of local flooding. Projected increases in winter rainfall will lead to an increased risk of flooding, particularly in the north and west of the country. Not only will there be a rise in the frequency of flooding but also in the size of floods. This means that new areas will become vulnerable to flooding, while existing flood-prone areas will be affected more often. Heavier rainfall events will also increase the risk of landslides and soil erosion.

Decreases in summer rainfall, coupled with a rise in rates of evaporation, will mean that low flows become more persistent. The greatest reductions in streamflow are likely to occur during the autumn months. It is in the more densely populated east of the country that these reductions are likely to be greatest. This will lead to problems of water supply, since the demand for water will increase during hotter summers, especially



with projected increases in population. Increased abstractions mean that less streamflow is available for diluting effluent, which will exacerbate problems of pollution, threatening ecosystems and human health. Higher temperatures will also increase the risk of water-borne disease.

Climate change has significant implications for aquifer levels. Decreases in rainfall during the summer and autumn months will result in a delay to the seasonal recharge of aquifers. Given that the variability of precipitation may well increase, a year with below average winter and spring precipitation could result in a severe groundwater deficit.

Reductions in soil moisture storage will occur throughout the summer and autumn months and may mean that irrigation is necessary to sustain crops, including pasture. Areas most likely to be affected are the south and east of the country. The nutrient status of soils could be affected by an increased incidence of wetting and drying.

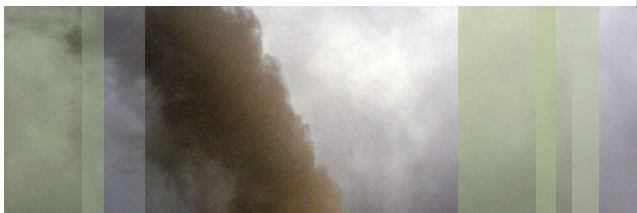


## How can we reduce vulnerability?

- One of the main priorities is to ensure that water supply sources and associated infrastructure are sufficiently robust to meet future demands, given the increased severity and duration of low flows.
- In order to minimise the economic and social costs of flooding, new and existing flood defences should be designed to withstand more frequent floods that are of a larger magnitude than at present. Planning decisions are also a vital component of reducing the flood risk. Areas at risk of inundation should be identified and restrictions placed on further floodplain development.
- Reductions in water quality are associated with increased frequency of low flows, growing rates of abstraction and increased volumes of sewage effluent from rapidly developing urban centres. Integrated planning and sound management are essential to ensure sustainable growth without an associated decline in water quality.
- Despite the general consensus that climate change will impact on water resources, there is considerable uncertainty surrounding the extent and variability of these changes. More research is needed to refine predictions in order to better inform future management planning and infrastructure for water supply and flood defence.



## 5th Scientific Statement Climate change and water resources in Ireland



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