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Europe is now in a race against the climate. With little hope of a global deal to cut greenhouse gas emissions, temperature rises of 3 or 4 °C above preindustrial levels are likely before 2100. That means countries have just decades to prepare.

Now a [report](#) by the European Environment Agency (EEA) outlines how the climate has already changed across the continent, and what will happen next. For the first time, we have a reasonably clear picture. From reshaping cities to defending coastlines, how will countries need to change to survive?

Surviving heatwaves

Extremes of temperature are becoming more common, so all of Europe will have to deal with more frequent and severe heatwaves. Parts of the south will see the biggest increase, because they are already hotter and are warming faster than the European average, along with the Arctic. But northern Europe will also see more heatwaves. Extreme heat can kill people, particularly older people. "We have an ageing population, which is more vulnerable," says Jacqueline McGlade of the EEA.

Many Mediterranean cities can cope with heatwaves. They tend to have narrower, shady streets and not too much heat-radiating concrete. "In the north, we're not equipped," says McGlade. The 2003 heatwave killed 35,000 people, many of them in France, and particularly Paris. McGlade says northern cities must become more Mediterranean and change their architecture and layout, with more green spaces and less concrete and tarmac. These changes will also help cities cope better with floods. Exposing the soil helps floodwater drain away, whereas if cities are concreted over the water has nowhere to go.

Wading through the water

All of Europe will face more frequent floods - as the UK is experiencing now - but northern and western countries will be worst affected. They will bear the brunt of extra storms coming from the Atlantic, which will be exacerbated by a steep rise in sea levels as Arctic ice melts.

Because areas like the North Sea are narrow, sea level will rise higher in the north than the south. Low-lying coastal areas will gradually disappear. Other coasts will be eroded faster. Storm surges will be higher, and reach further inland.

Much of the Netherlands lies below sea level, and has long fought to keep out the water. Parts of Europe will need to follow suit. The country has retreated from some regions, evacuating communities and allowing wetlands to grow up. Amphibious houses that float upwards when their area floods have been built. Europe's coast is too vast to save but important ports like London and Copenhagen should bolster their sea defences.

Keeping the lights on

Several power sources will struggle in a hot future, but others may fare better. Mountainous areas such as the Alps and Scandinavia rely on hydroelectric dams. These need a steady flow of water year round, but by 2050 "they could go full pelt in winter, but be unable to run in summer", McGlade says. Extra

winter power could be good, but inconsistency is not.

Nuclear power produces large amounts of reliable energy with low greenhouse gas emissions. But many plants are on the coast, for easy access to cooling seawater. That makes them vulnerable to rising sea levels. The disaster at the Fukushima Daiichi plant in Japan last year was a reminder of what can go wrong. Sea defences were not high enough to hold back the tsunami and backup generators were knocked out. If we want more nuclear power, plants must be better protected or use different cooling methods.

On the plus side, northern Europe could produce a lot of biofuel, thanks to longer growing seasons. This will make it possible to grow more crops in places like Scandinavia. Wheat may struggle in the rain-drenched soil, but biofuel crops like willow could flourish.

Feeding the masses

Crop production faces a welter of problems: water shortages in the south, floods and storms in the north, and frequent heatwaves everywhere.

Mediterranean countries will have to abandon many staples as it will be too hot to grow them economically. Farmers here will need to switch to drought-tolerant crops, such as sorghum and millet.

Poorer countries in the south-east, such as Bulgaria, Romania and Turkey, are at great risk, but if irrigated efficiently they could become the continent's breadbasket. "These countries have huge potential to help feed Europe," McGlade says.

The UK could actually benefit, says Deborah Hemming of the UK Met Office in Exeter, as higher temperatures will mean a longer growing season, though this will come with more storms. Fisheries will also be affected, as marine species move north to find cooler waters.

Staying afloat

Europe's economy has enough problems, as countries struggle to recover from the 2008 financial crisis. There might be worse to come. "Climate change is the stalking horse of the financial crisis," says McGlade.

While rich countries can buy their way out to some extent, by investing in adaptations like sea defences, poorer countries cannot, she says. "The imbalances we have today are going to deepen."

This unevenness is reflected in countries' preparedness so far. Only 14 countries have submitted so-called National Adaptation Plans to the European Union, all of them northern and western. Countries need to build up savings to cover the costs of future disasters like floods, says Christian Egelhofer of the Centre for European Policy Studies in Brussels. But this is difficult when their economies are already stalled.

South-eastern countries like Bulgaria are the poorest and will not be able to adapt without help. Small countries like Switzerland are also at risk, says Egelhofer, as one disaster could derail their economies. "There is no way they could compensate for that," he says.

Mediterranean countries are vulnerable not only due to their financial troubles, but also because of their reliance on agriculture and tourism. "One-third of global tourists go to the Mediterranean," he says. "This is a very vulnerable system." These countries need to find a new way to make a living.