



# SCIENCE FOR ENVIRONMENT POLICY

## Visualising climate change effects on global cities: by 2050 Madrid's climate may be like Marrakech's



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**Tackling climate change requires global behaviour change across all sectors of society.** Many people, however, struggle to visualise how climate change will impact daily life — something that is key to motivating them to change their behaviour and demand urgent measures from governments and businesses. This new study illustrates how the climate of iconic cities will change in just 30 years by pairing them with other well-known cities that currently have their future climate.

Currently, half of the world's population lives in cities and, by 2050, about 80% of Europeans will live in urban areas. Relatable visualisations and illustrations of how climate change will affect these urban areas are able to package complex climate data into tangible, engaging formats. As such, they have a potentially important role to play in helping residents understand how climate change will impact them, while also enabling land managers and city planners to visualise the climate futures of their cities so they can prepare and adapt accordingly.

This study analyses climate change by matching cities with different climates on different timelines — for instance, taking present-day London, forecasting how its climate will change in the next 30 years, and selecting a present-day city with that climate to illustrate the change.

The analysis explored bioclimatic variables for 520 major cities, including yearly averages, seasonal data and monthly extremes for rain and temperature for current and projected (2050) climates. The projected climate in 2050 was an average of several ecological models of a conservative climate change scenario Representative Common Pathway 4.5 (RCP 4.5). The results showed that, even using this optimistic scenario, the climates of over 77% of the world's major cities will change to such an extent that they will more closely resemble the conditions of another major city at a lower latitude. Globally, cities become hotter, wet



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## Visualising climate change effects on global cities: by 2050 Madrid's climate may be like Marrakech's (continued)

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seasons become wetter, dry seasons become drier and droughts become more severe. In addition, 22% of major cities are likely to exist in a climatic regime that does not currently exist on the planet today. Of these, most are located in the tropics, including Kuala Lumpur, Malaysia and Singapore.

Cities in the northern hemisphere will experience the most dramatic shifts in extreme conditions. Europe, for example, will see warmer summers and winters<sup>1</sup>, with average temperature increases of 3.5°C and 4.7°C, respectively. These changes are akin to a city shifting around 1 000 kilometres south, towards the subtropics, at a speed of around 20 kilometres per year. By 2050, the northern hemisphere will be very different: climate-wise, Madrid will be more similar to present-day Marrakech, Morocco; London to Barcelona; Stockholm to Budapest; and Tokyo, Japan, to Changsha, China.

The results provide a clear and comprehensive mental image of what specific cities may look like in the near future. The researchers suggest that their 'city analogues' approach can be used for various purposes, including to help global citizens understand and prepare for the impact of climate change on their daily lives (and potentially garner related behaviour change). This global assessment can also help city planners and policymakers visualise the climate futures of their cities and regions, in order to inspire and facilitate effective decision-making in response to climate change.

1. While this study forecasted temperature change 30 years into the future, seasonal temperatures are already noticeably increasing as a result of current-day climate change, with cities attempting to adapt to its impacts (e.g. floods and droughts).