UNIVERSITY OF BIRMINGHAM

WM-Air Impact Case Study

Mapping climate risk and vulnerability for the West Midlands

Climate Risk and Vulnerability Assessments for Birmingham and West Midlands now supporting climate action

Birmingham rated an A-grade city for transparency and climate action

CRVA underpinning Birmingham Local Plan that determines planning policy in the city for the next 20 years

Effective collaboration and co-development – 3 CRVAs to support regional and local decision-making

Policy + Legislation - WMCA's internal Climate Adaptation Plan 2024.

Policy + Legislation - Birmingham Local Plan for the next 20+ years

Capacity building + Policy: BCC adopted the CRVA within the city's Observatory for joined-up decision making

The climate is changing and local and regional governments must ensure that climate risk is addressed in decision-making and policy to ensure citizens are protected. Climate risk is experienced unequally among citizens, and often those living in underserved areas with higher levels of socio-economic deprivation are more vulnerable to climate change impacts. The development of a climate risk and vulnerability assessment (CRVA) map identifies the spatial variability in climate risk and demonstrates how different underpinning factors can influence climate risk. In turn, the CRVA allows decision-makers to plan climate adaptation measures for new or existing developments.

Background - why does this work matter?

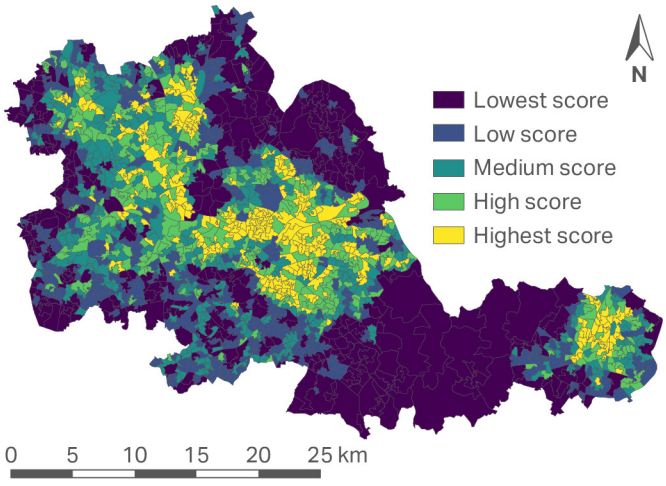
Extreme weather events are becoming more frequent because of climate change. Heavy rainfall events and hot summer temperatures cause damage and disruption in urban areas, and local authorities and other organisations who plan, design, build, manage, maintain and operate infrastructure and the built environment must understand climate risk within their regions. The Climate Risk and Vulnerability Assessment (CRVA) shows how risk and vulnerability vary across a region. The mapping approach developed with Birmingham City Council (BCC) uses publicly accessible data and can be replicated by other local authorities.

A CRVA helps increase resilience by:

i. raising the profile of climate adaptation within local authority processes, e.g. planning, urban forestry.

ii. quantifying relative climate risk and vulnerability at different scales, e.g. development, Lower Super Output Areas, Wards, to support decisions at these scales.

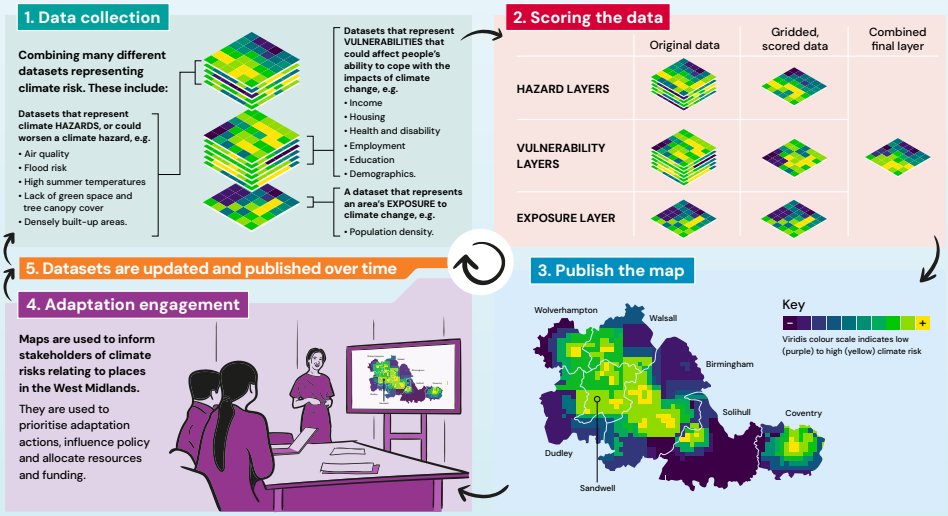
iii. understanding how prospective developments can alter climate risk and vulnerability, to ensure climate positive development.



Method – what did we do?

WM-Air was approached to support the development of a Birmingham Climate Risk and Vulnerability Assessment (CRVA) tool in Oct 2022. WM-Air worked closely with BCC's GIS team (primarily Stephen Jones) to develop the CRVA methodological approach, visualisation, and publication of materials that would be of most benefit to BCC. We also engaged with several members of the BCC planning team (e.g. Andy Fuller, Andy Lindop, Henry Cross, Kim Yates) to understand how the CRVA could support the work they do.

Following on from the development of the BCC CRVA, West Midlands Combined Authority (WMCA) worked with WM-Air to apply for a further £150k funding from Natural Environment Research Council (NERC) to develop a WM-wide CRVA. From October 2023, WM-Air and WMCA expanded the CRVA from Birmingham to the West Midlands. Bethany Haskins provided advice and guidance to ensure progress addressed the needs of WMCA. This included arranging contact with WMCA's Data and Insights Team (e.g. Si Chun Lam, Timothy Katheru) and TfWM (e.g. David Harris). A WMCA Graduate Intern (Will Higgins) also joined these meetings, particularly to support the delivery of graphics with the support of a contracted graphic designer (Will Baxter).



What tools/outputs were developed?

- CRVA method paper.
- Futurebuild newsletter Guest Editor and contributor (November 2023, emailed to 40,000 members)
- Futurebuild newsletter Guest Editor and contributor planned for October 2024.
- Article in Urban Design Journal, Spring 2024 (hard copy only, no link)
- BCC-hosted public facing CRVA map.
- BCC news on achieving a CDP A-grade.

Outcomes, Impacts and Benefits delivered

Birmingham CRVA

The main outcome is that BCC received its first A-grade by CDP for transparency and bold climate action. Until 2023, BCC had only received a B-grade, and this was part due to missing a climate risk and vulnerability assessment. The public-facing CRVA link is directly referred to in BCC's CDP submission in 2023. Moreover, it would have not been possible to provide the high-resolution air quality layers utilised in the CRVA without the WM-Air modelled air quality maps at 10m resolution produced by Strand 3 of the project. Ward and LOSA maps are currently available on the city website for public viewing, along with information on the methodology, and what the maps mean for the city. Moving forward, 100m resolution maps will be integrated into the city's outward facing urban observatory and internal geospatial data platforms.

"The collaboration with Birmingham University has led to the development of a method of measuring the impact of Climate Change, which is a ground breaking piece of research. This research has now been incorporated into Birmingham City policy as part of its Journey to Net Zero. It was part of BCC achieving an A Grade from CDP"

Stephen Jones (Lead Data Engineer – Geospatial), BCC

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SEE Redefining Sustainability Conference 2024, Dubai: Received Special Recognition Award

CIHT Research Award 2024: Shortlisted for Regional (West Midlands) and National Awards. Commended at National Awards.

> **"I cannot stress enough that we would never have reached this point without the support from the WM-Air Team and I would like to extend my thanks to them for all their hard work and expertise that they have put in to reaching this point."**
>
> **Bethany Haskins-Vaheesan (Climate Adaptation Project Officer), WMCA**

About WM-Air: Clean Air Science for the West Midlands

WM-Air ("Clean Air Science for the West Midlands") is a NERC-funded initiative, led by the University of Birmingham, working in collaboration with over 20 cross sector partners, to apply environmental science research expertise to improve air quality in the West Midlands, delivering health, economic and environmental benefits.

wm-air.org.uk

UKRI Natural Environment Research Council

West Midlands CRVA

Two CRVA maps were produced with the WMCA; a community CRVA similar to that produced with BCC, and a transport-CRVA to support regional transport resilience. Data and final map outputs will be published by WMCA in late 2024. At the time of writing public-facing outputs (LSOA level layers) are being processed by WMCA for which will be hosted on its Environment and Net Zero Data Dashboard (placeholder for Climate Change Adaptation is in place). Having co-developed graphics and visualisation outputs, WMCA are better equipped to communicate climate risk to its citizens and stakeholders, which is especially important as WMCA has begun to raise the profile of adaptation, since the publication of the first West Midlands Adaptation Plan in 2021. Additionally, WMCA will submit its first ARP report to DEFRA in 2024. Transport for West Midlands (TfWM) stakeholder engagement on climate risks to transport has also improved, due to their direct involvement in the development of final map outputs. Outputs will be hosted on the TfWM Data Insight for the Community platform.

Without the CRVA development, BCC and WMCA had no means to quantify and baseline climate risk. The CRVAs have delivered new local and regional capacity to understand climate risk and vulnerability, incorporate this within decisions, and monitor the impact of adaptation moving forward. Although there are financial constraints at BCC, WMCA are also able to support having increased technical capacity related to climate change across both organisations due to CRVA data. Other WM-Air involvement with WMCA including the Air Quality Framework demonstrates broader environmental links and raises the profile and legitimacy of the CRVA research outputs for the region.

The CRVA tool has been presented to approximately 500 people at more than 20 conferences and events.

Looking to the Future/Legacy

CARMINE – an EU-Horizon funded project which began in March 2024 is a €12m 4-year project focused on delivering climate-resilient development pathways in metropolitan regions of Europe. Birmingham is one of 8 case study areas across Europe where this project is focused. Emma Ferranti and Sarah Greenham (UoB) along with Simon Needle (BCC) are part of the UK project team. The CRVA and its related outputs will play a role in part of the review of climate change adaptation policy and its methodological approach may also be reviewed as part of the development of digital twins across the case study areas.

Underpinning Science

- Peer review paper (accepted): Greenham, S.V., Ferranti, E.J.S., Jones, S., Zhong, J., Grayson, N., Needle, S., Acton, W.J.F., MacKenzie, A.R. and Bloss, W.J., 2024. "An open access approach to mapping climate risk and vulnerability for decision-making: a case study of Birmingham, United Kingdom". Climate Services
- Conference paper (submitted, under review): Greenham, S.V., Ferranti, E.J.S., Cork, N., Jones, S., Zhong, J., Grayson, N., Needle, S., Acton, W.J.F., MacKenzie, A.R. and Bloss, W.J., 2024. Scaling up from local to regional: Progress in mapping climate risk and vulnerability across the West Midlands for decision-making. ISHS Green Cities Symposium 2024, RHS Wisley, Surrey, UK.
- Ferranti, E., Cook, S., Greenham, S.V., Grayson, N., Futcher, J. and Salter, K., 2023. Incorporating Heat Vulnerability into Local Authority Decision Making: An Open Access Approach. Sustainability, 15(18), p.13501.

Partners

Birmingham City Council

West Midlands Combined Authority

More info and URLs: