CUSSH

与城市合作，改变城市环境质量、
可持续性、人口健康和卫生公平性

working with cities to transform environmental quality, sustainability, population health and health equity

Kufanya kazi na miji ili kubadilisha ubora wa mazingira, uendelevu, afya ya watu na usawa wa afya.

travailler avec les villes
pour transformer la qualité
environnementale, le développement
durable, la santé des populations
et l'équité en termes de santé.

ANALYSES current and emerging evidence and city strategies

DEVELOPS viable paths for policy implementation

MODELS the health and environmental impacts of city interventions and policies

CUSSH

TRACKS local indicators of sustainability and health, including outdoor air pollution, carbon emissions, weather/climate, greenspace, and active travel

RESEARCHES interactions between different parts of the urban system

‘Cities are complex systems with unique contexts and priorities. Our approach is to engage with partner cities in a participatory process to build a shared understanding of the multiple interactions between different parts of the urban system that will inform the development and implementation of new city policies.’

Prof Mike Davies
(CUSSH Programme Director)

‘Our group is modelling the potential health gains from exercise and physical fitness arising from alternative scenarios of active transportation (walking and biking). Narrowing in on best estimates of daily exercise levels is not trivial, however, and, as part of CUSSH, our University of Wisconsin team is combining best practices and refining previous models to develop new estimates that are both robust and more accessible to end users interested in applying our modelling software to their local situations.’

Professor Jonathan Patz
(Director of the Global Health Institute, University of Wisconsin-Madison, and lead author, Intergovernmental Panel on Climate Change (IPCC))

About CUSSH

Complex Urban Systems for Sustainability and Health (CUSSH) is a four-year international research project. Starting in 2018, CUSSH is working with thirteen partner organisations across four continents to help cities develop in ways which improve population health and environmental sustainability. In each of six cities (London (UK), Rennes (France), Kisumu and Nairobi (Kenya), and Beijing and Ningbo (China)) its work will focus both on local priorities and city-scale actions aligned with planetary health.

Through our close partnerships with local organisations, CUSSH will learn how policy decisions to achieve health and sustainability goals can be improved and accelerated.

To do this, our process includes steps that we hope will provide evidence essential to achieving population-level changes in areas including energy provision, transport infrastructure, green infrastructure, water and sanitation, and housing.

They include:

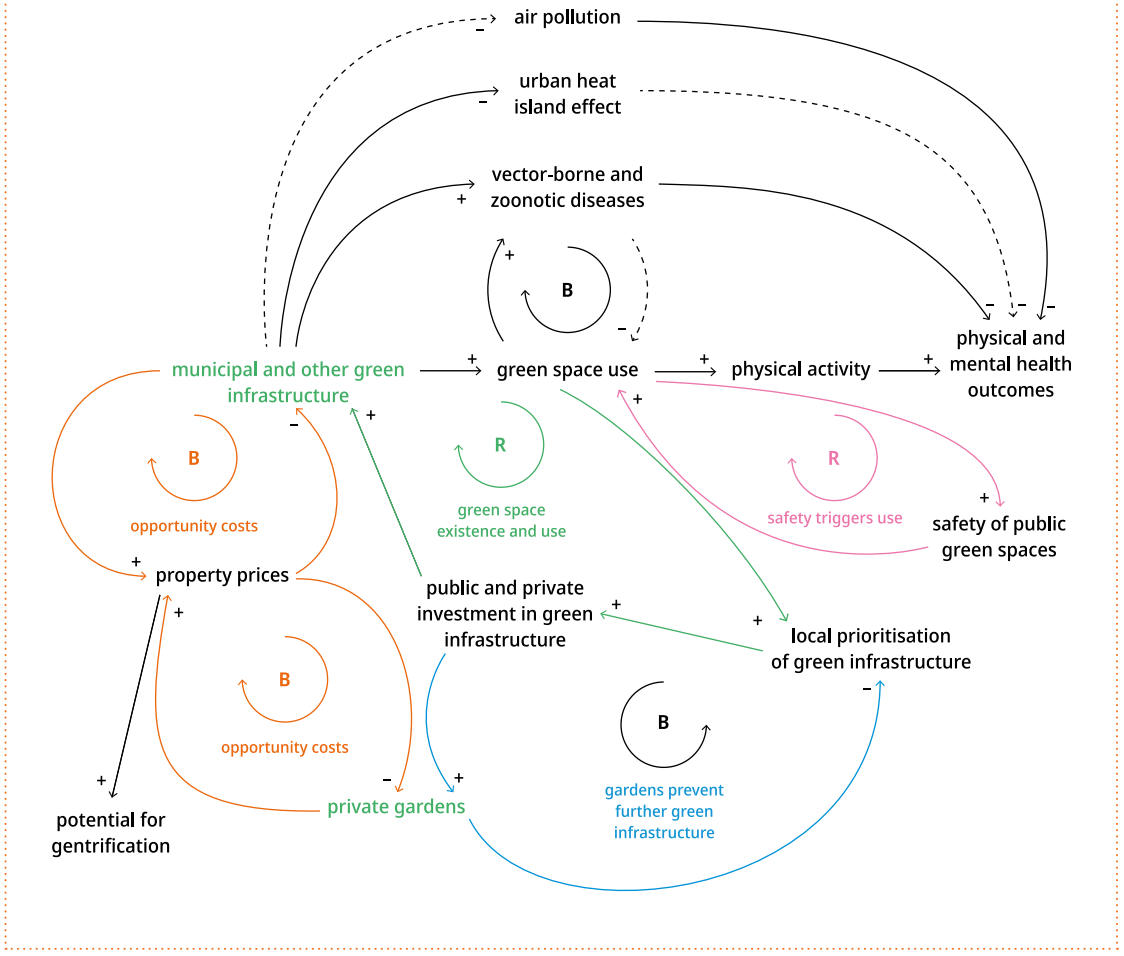
- reviews of evidence on potential solutions;
- development and application of methods for tracking the progress of cities towards sustainability and health goals;
- development and application of models to assess the impact on population health, health inequalities, socio-economic development and environmental parameters of alternative urban development strategies to support policy decisions;
- iterative in-depth engagements with stakeholders in partner cities in low-, middle- and high-income settings, based on participatory methods, to test and deliver the implementation of the transformative changes needed to meet local and global health and sustainability objectives
- public engagement and training, based on principles of co-generation of research

LONDON

In London CUSSH is examining strategies to help achieve the goal of becoming a zero-carbon city with ambitious improvements in environmental quality, including air pollution.

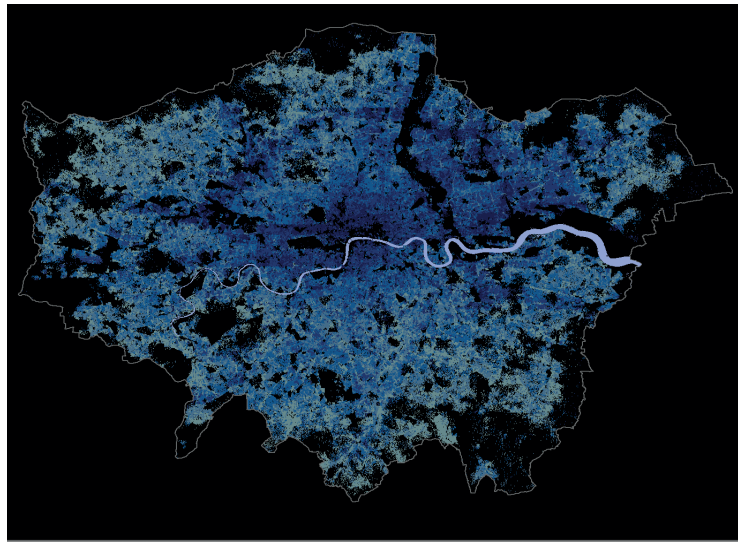
Some initial research is concentrating on green infrastructure and the Mayor's Environment Strategy sets the target of making more than half of London green. Our work will involve investigating how our natural spaces can foster health, support social and active communities, and be valued alongside the built environment. Understanding these areas better will help us to develop green infrastructure strategies that deliver sustained improvements to local health, wellbeing, and carbon emissions.

The best strategies for local green spaces will depend on the people using them and the decision-makers implementing the agenda. Therefore, this priority will benefit from a place-based, participatory research agenda driven by local residents, stakeholders and decision-makers. To combine multiple perspectives, the research will also benefit from a whole-systems approach capable of capturing complexity. Evidence on the interactions between nature, behaviour, and health, as well as effective approaches to behaviour change and policy implementation, will help to design local solutions that work.



←The CUSSH building physics modelling framework enables indoor overheating risk to be estimated during hot weather, under a range of climate change, urban climate, and housing adaptation scenarios.

→CUSSH uses a UCL-developed building physics tool and housing model to estimate indoor exposures to air pollution across London, and how exposures may change under different policy scenarios.



↑Our early work with London included the development of a causal loop diagram of the use of green spaces. It reveals that municipal and other green infrastructure might have unintended consequences via vector-borne diseases, but it creates small positive physical and mental health outcomes via a reduced heat island effect and air pollution, and large effects via physical activity. It also shows the important interactions between green space use and the safety of public green spaces or the local prioritisation of green infrastructure, but also unintended effects in terms of property prices and the potential for gentrification.

BEIJING & NINGBO

CUSSH is working with our two partner cities in China to understand the most pressing environment and health concerns and the potential of different development strategies to achieve desired goals. By using participatory engagement and evidence development, the aim is to help create inclusive solutions to the cities' environment and health challenges, and inspire broader city-wide changes based on scientific evidence.

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'The challenge faced by our cities is how to achieve green and sustainable development on the premise of ensuring stable economic growth. CUSSH aims to identify city-wide changes, significant reductions in greenhouse gas emissions and dramatic improvement of air quality which will contribute a lot to the sustainability of urban development in cities in China.'

Prof. Liu Qi-yong
Chinese Center for Disease Control and Prevention,
Chief Scientist for climate change and health adaptation

NAIROBI

Nairobi is the seat of both Kenya's national and county governments and is the focal point of service provision for both. The primary focus of engagement with the county government is on the development of spatial plans for two districts in which substantial development is planned.

Participatory approaches involving all sectors, residents, and politicians to achieve buy-in will contribute to the design of integrated district plans. These approaches will give the public a real voice in spatial planning. Nairobi County Government leadership, together with the CUSSH research team, will apply systems thinking to drive fundamental rethinking of problems and solutions and to develop policy options and implementation strategies.

'All plans in the city must be grounded on the Nairobi Integrated Urban Development Master Plan (NIUPLAN), aimed at decentralizing functions to sub-centres. CUSSH's contribution is in the two areas: one is in the western part of the city with more affluent residential areas (Woodley), while the other is in the eastern part of the city, with more high-rise developments, dense population, and poorer residents (Kasarani).'

Ruth Waruguru Muroki,
Director of Urban Policy & Research,
Nairobi City County Government

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KISUMU

Kisumu faces multiple environmental challenges, including such issues as poor housing, industrial and household waste management, and contamination of Lake Victoria, with consequent reduction in fish stocks and adverse effects on water quality. Access to adequate sanitation has remained unattainable for slum households, the city faces a solid waste management challenge, and deforestation on the hills above the city have increased flood risks.

Stakeholder engagement through participatory system dynamics workshops will bring together different sectors, including land, environment, housing, transport and public voices, to discuss sustainable solutions to the city's longstanding challenges. This will be done by assessing the decision making and implementation process of existing policies. Systems thinking will provide an opportunity to the government to address challenges through a truly cross-sectoral approach.

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'The community expressed a need for housing and sanitation, especially in low income areas. We can synergise with programs looking at accessibility to congested areas, flooding, green energy, and housing. We are optimistic about the impact of the project in the next four years.'

Evans Gichana
Chief Officer ,Department of Climate Change and Green Energy, Kisumu County

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RENNES

As a city, Rennes has been in the vanguard of action on sustainability. Back in 1981, it was the first major city to implement differentiated management of green spaces, was a pioneer of public health initiatives through the founding of the French Healthy Cities Network in 1994. Today, an important policy objective in moving towards a resilient zero carbon city is the low carbon transition (50% reduction in greenhouse gas emissions and energy consumption by 2030), within which shorter-term targets are part of Rennes' essential first steps in an evolving, ambitious programme to achieve far-reaching change. Its Climate Plan will have 10 objectives and 109 actions, with 350 million euros invested by 2024.

Already committed to healthy sustainable development, Rennes' aim is to now translate its environmental commitments into commensurate action through testing an inclusive and equitable process that all residents are able to both contribute to and benefit from. Potential actions include:

- Decarbonisation of the energy supply using clean renewable options, so that by 2020, 100% of municipal facilities will be supplied using sustainable electricity, and 50% of their heating sourced from district heating networks.
- Highly energy efficient building stock and the renovation of 6,000 public and private housing units per year
- Very low carbon transport systems and the promotion of active travel options and electric public transport
- 20% of the city's surface area (1,000 hectares) to become green space for watershed protection, to avoid heat islands, and improve health and well-being.

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The CUSSH project has been co-created with city stake-holders, through the use of a Participatory System Dynamics framework. Although many relevant datasets on urban sustainability and health are available in Rennes, there has been no formalized way of collaborating around complex systems issues. Rennes values the input of CUSSH expertise to develop health and sustainability evidence, and inform decision-making and implementation by identifying interventions in the city that maximize co-benefits and minimize negative unintended consequences.

SOME EARLY CUSSH PUBLICATIONS

Dianati K, Zimmermann N, Milner J, Muindi K, Ezeh A, Chege M, Mberu B, Kyobutungi C, Fletcher H, Wilkinson P, Davies M. (2019) Household air pollution in Nairobi's slums: A long-term policy evaluation using participatory system dynamics. Science of The Total Environment. Volume 660, 10 pp 1108-1134. 10.1016/j.scitotenv.2018.12.430

Taylor J, Symonds P, Shrubsole C, Mackenzie I, Davies M (2019) Application of an indoor air pollution metamodel to a spatially-distributed housing stock. Science of the Total Environment. In Press. 10.1016/j.scitotenv.2019.02.341

Sanchez-Guevara C, Nunez Peiro M, Taylor J, Mavrogianni A, Neila Gonzalez J (2019) Assessing population vulnerability towards summer energy poverty: Case studies of Madrid and London. Energy and Buildings. In Press 10.1016/j.enbuild.2019.02.024

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